FIRST LINES

FOR

CHEMISTS AND DRUGGISTS.

BY

JOHN STEGGALL, M.D.

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FIRST LINES

FOR

CHEMISTS AND DRUGGISTS.

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FIRST LINES

FOR

CHEMISTS AND DRUGGISTS

PREPARING FOR

EXAMINATION BEFORE THE BOARD

OF THE

PHARMACEUTICAL SOCIETY.

BY

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PREFACE.

The following pages are especially designed for the use of those gentlemen who are intending to present themselves for examination before the Board of the Pharmaceutical Society. The subjects treated of are those upon which candidates are examined; and they have been considered and studied to be made as plain, clear, and intelligible as it seemed possible to the author to render them. Similar subjects will be found in separate works, but they are generally described in language too scientific for the younger branches, and only suited to the capacities of those who have attained a considerable share of knowledge. The main object has been to supply, at a small expense, a mass of information highly necessary and useful to the Pharmaceutical Chemist.

The Questions appended are intended as a stimulus to inquiry and as aids to reflection, not as a means or suggestion for acquiring knowledge fallaciously, in a parrot-like manner.

2, Southampton Street,
Bloomsbury Square.

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PHARMACEUTICAL CHEMISTRY.

ACIDS.

Acids are compounds distinguished by their sour taste, by combining with alkalies to form salts, and by their effect upon vegetable colours; the stronger acids turning blue (especially litmus) to red.

Acetum destillatum. *Distilled Vinegar.*

In obtaining this, a gallon of ordinary vinegar is used, and submitted to distillation in glass vessels, in consequence of the acids acting readily upon the ordinary metals used in stills. The first seven pints passing over are preserved for use, and one is left in the retort, containing all the impurities which are intended to be separated from the vinegar by the process.

The ordinary impurities of vinegar in this country are mucilage, colouring matter, sulphuric acid, and occasionally a small quantity of metallic impregnations from copper, lead, or tin. Sulphuric acid is almost always present, being allowed by government to be added in the proportion of one part in a thousand.

Distilled vinegar is colourless, by heat ought to pass entirely into vapour, and throw down no precipitate on the addition of acetate of lead, nitrate of silver, or iodide of potassium to it. The colour of it should not be affected by hydrosulphuric acid or ammonia. If silver leaf be digested with it, no precipitate should afterwards be thrown down by hydrochloric acid. The strength of it is known by 100 grains of the acid saturating 13 grains of the crystals of carbonate of soda.

In the above tests acetate of lead refers to sulphuric acid, and would form a white sulphate of lead.

Nitrate of silver is used as a test for hydrochloric acid, forming with it a white chloride of silver, insoluble in nitric acid, but soluble in ammonia.

Iodide of potassium applies to lead, with a solution of which it forms a yellow iodide of lead.

Hydrosulphuric acid detects many metals.

Ammonia recognizes the presence of copper, when present, forming with it a solution of a blue colour.

Silver leaf digested with it, and afterwards hydrochloric acid dropped in producing no precipitate, proves the absence of nitric acid.

ACIDUM ACETICUM. *Acetic Acid.*

This acid has also been named pyroligneous acid, and acidum aceticum e ligno destillatum. It is procured, according to the Pharmacopœia, by adding sulphuric acid to the acetate of soda, in which case the sulphuric acid combines with the soda, forming the sulphate of soda, setting free the acetic acid, which is separated and obtained by distillation. If the heat be raised too high towards the end of the process, there is fear of some sulphuric acid being driven over.

Acetate of soda is obtained in the following manner: Green wood is put into iron cylinders, which are heated to redness; by the action of the heat, the elements of the wood combine to form a sour liquid named pyroligneous acid, which passes over, contaminated with some tarry matter, into a receiver. To separate the tar, lime is first added to the liquid, and forms with the acid a pyrolignate of lime; the tar floating on the surface is then partly removed. Sulphate of soda is subsequently added to the pyrolignate or acetate of lime, when a double decomposition takes place, and the products are a comparatively insoluble sulphate of lime, and a soluble acetate of soda. The solution of acetate of soda is then heated to expel the water, and the temperature is afterwards raised to about 300 degrees, sufficient to drive off the remaining tarry matter, but not to decompose the acetate of soda, which is afterwards dissolved in water and evaporated to form crystals, to be kept for use.

Acetic acid should have a specific gravity of

1.048; and 100 grains of it ought to saturate 87 grains of crystallized carbonate of soda. One part of this acid, with rather more than six parts of water, will produce a liquid of the same strength as distilled vinegar.

Composition of dry acetic acid.

3 atoms	oxygen	3 × 8 =	24
3 ,,	hydrogen	3 × 1 =	3
4 ,,	carbon	4 × 6 =	24
			51

The strongest liquid acetic acid contains one equivalent of water, making its atomic number 60.

ACIDUM BENZOICUM.

Benzoic Acid, or Flowers of Benzoin.

This acid is obtained by applying heat to benzoin in an alembic, and the heat may be raised to 300 degrees. The acid being volatile is sublimed in the upper part of the apparatus, but is impure from the presence of a little empyreumatic oil produced by decomposition of part of the resin by the heat. To remove this oil the acid is first pressed in blotting-paper, to absorb the oily matter, and the acid is again sublimed in a more pure and beautiful form.

Benzoic acid may also be procured by boiling benzoin in water, with solution of potash or with lime; in which case the benzoic acid will unite with the potash or lime. When hydrochloric acid is added to this solution decomposition takes place, the chlorine combines with the metal, forming a chloride of potassium or calcium, and the hydrogen uniting with the oxygen of the metal forms water, and the benzoic acid is set free, which, being sparingly soluble in water, is gradually deposited. The acid thus obtained is less in quantity, and possesses less aroma, than the acid procured by the process of the London Pharmaeopœia.

Qualities. It is white, in feathery satin-like crystals, with a peculiarly pleasant aroma. By heat it is volatilized, sparingly soluble in water, more copiously in rectified spirits. It is dissolved by a solution of potash or lime, and again precipitated by hydrochloric acid, as before mentioned.

Composition of benzoic acid.

3 oxygen	3 × 8 =	24
5 hydrogen	5 × 1 =	5
14 carbon	14 × 6 =	84
Dry acid	.	113
Water	. .	9
Crystallized benzoic acid		122

This acid is considered by many chemists to be a compound of oxygen, with a principle named *benzule.*

Benzule is composed of	carbon	14 equiv.
	hydrogen	5
	oxygen	2

ACIDUM CITRICUM. *Citric Acid.*

Ingredients. Lemon-juice, prepared chalk, dilute sulphuric acid, and distilled water.

Decomposition. When the lemon-juice and chalk are boiled together, the citric acid combines with the lime, forming an insoluble citrate of lime, which is precipitated, and carbonic acid gas escapes with effervescence. The precipitate is then washed, to remove the mucilage and colouring matter, and is afterwards treated with dilute sulphuric acid, which decomposes the citrate, combining with the lime to form a sparingly soluble sulphate of lime, and the citric acid is set free in solution, from which it is obtained in crystals by evaporation. If the crystals appear not clean enough they are to be repeatedly dissolved and crystallized.

The average quantity of citric acid in a pint of lemon-juice is about 11½ drachms.

Composition of anhydrous citric acid.

$$\begin{array}{lcccccr}
2 \text{ hydrogen} & 2 & \times & 1 & = & 2 \\
4 \text{ oxygen} & 4 & \times & 8 & = & 32 \\
4 \text{ carbon} & 4 & \times & 6 & = & 24 \\
\cline{7-7}
 & & & & & & 58
\end{array}$$

According to Mr. Phillips, the acid usually met with crystallizes with rather more than one equivalent of water, which brings its atomic number to about 70.

If water be saturated with citric acid, at a temperature of 212, and then allowed to cool, the acid will crystallize with one equivalent of water only.

Qualities. It is transparent, and soluble in water. The precipitate produced by it with the acetate of lead ought to be dissolved by dilute nitric acid. No salt of potash, except the tartrate, throws down any precipitate. It is completely decomposed and disappears by the action of heat.

Acetate of lead refers to sulphuric acid; the sulphate of lead being insoluble in nitric acid.

The salts of potash have reference to tartaric acid, which would form with them a precipitate of bitartrate of potash.

The heat refers to the presence of any fixed bases.

ACIDUM HYDROCHLORICUM. *Hydrochloric Acid.*

Ingredients. Chloride of sodium, sulphuric acid, distilled water.

Decomposition. When the chloride of sodium, the acid, and half the water, are heated together, some water and the chloride are decomposed; the oxygen of the water combining with the sodium forms soda; this, with the sulphuric acid, forms sulphate of soda; the hydrogen, combining with the chlorine, forms hydrochloric acid gas, which passes over into the receiver, where it is absorbed by the water placed there for that purpose, and a super-sulphate of soda remains in the retort.

Hydrochloric acid, of the Pharmacopœia, is a solution of hydrochloric acid gas in water, which it takes up in the quantity of 480 times its volume, and by weight contains ten per cent.

Composition of hydrochloric acid gas.

1 chlorine = 36
1 hydrogen = 1
—
37

Qualities. It is colourless: by heat passes entirely into vapour; mixed with distilled water, it throws down no precipitate with the chloride of barium, with ammonia, or the sesquicarbonate of ammonia. It has no effect upon gold leaf, even when heat is applied. It does not remove the colour from a solution of sulphate of indigo. Its specific gravity is 1.160. 132 grains of crystallized carbonate of soda are saturated by 100 grains of this acid.

If coloured, this acid probably contains some free chlorine or iron.

Passing entirely into vapour shows the absence of solid matter.

Chloride of barium refers to sulphuric acid.

Ammonia and the

Sesquicarbonate of ammonia refer to earthy impurities.

Gold leaf applies to free chlorine, as also the sulphate of indigo.

ACIDUM HYDROCYANICUM DILUTUM.

Dilute Hydrocyanic Acid.

Ingredients. Ferro-cyanide of potassium, sulphuric acid and water.

Decomposition. When the above are mixed together, three atoms of water act upon three equivalents of cyanide of potassium; and the oxygen of the water combining with the potassium forms potash, the hydrogen with the cyanogen forming hydrocyanic acid; the sulphuric acid present combines with the potash and forms three equivalents of bisulphate of potash, and there remains out of the ferro-cyanide a yellow salt, described by Mr. Everett as consisting of two equivalents of cyanide of iron, and one equivalent of cyanide of potassium. By heat, the hydrocyanic acid passes over, with some water, into the receiver. It is to be diluted to such an extent of strength that $12\frac{7}{10}$ grains of nitrate of silver may be decomposed by 100 grains of this liquid; in which case the precipitate is cyanide of silver.

Hydrocyanic acid is also ordered to be obtained from cyanide of silver and hydrochloric acid. The decomposition here is the following: the chlorine combines with the silver to form an insoluble chloride of silver; and the hydrogen with the cyanogen forms hydrocyanic acid. This acid is very prone to decomposition on exposure to light and air, and should be kept, therefore, in dark bottles with their necks and stoppers under water.

Qualities. It is free from colour; and by heat the whole of it passes into vapour, with a peculiar odour. It reddens litmus, but the colour soon goes off, in consequence of the volatility of the acid: it is not coloured by hydrosulphuric acid passed through it. Nitrate of silver will throw down 10 grains of cyanide of silver, soluble in hot nitric acid, from 100 grains of this solution. It will become red on the addition of the iodo-cyanide of silver and mercury only if some other acid be present: it contains 2 per cent. of strong hydrocyanic acid. If not perfectly volatilized by heat, it will be impure from the presence of some fixed salt. The nitrate of silver is used as a test for hydrochloric acid; the chloride of silver being insoluble in hot nitric acid.

Composition.

1 cyanogen = 26
1 hydrogen = 1
Atomic weight 27

Acidum Nitricum. *Nitric Acid.*

Ingredients. Dried nitrate of potash and sulphuric acid.

Decomposition. The sulphuric acid combines with the potash to form a bisulphate of potash, and the nitric acid with the water from the sulphuric acid passes over into the receiver.

The advantages of using an excess of sulphuric acid are the following: 1st, sufficient water is supplied to afford liquid nitric acid. 2d, Nitrous acid does not pass over. 3d, The bisulphate of potash is more easily removed from the retort than the sulphate.

Composition of anhydrous (hypothetical) nitric acid.

5 oxygen $5 \times 8 = 40$
1 nitrogen - $= 14$
$\overline{54}$

Liquid nitric acid is considered by most chemists to contain 2 equivalents of water; but according to Mr. Phillips only 1½.

Qualities. By heat, it passes entirely into vapour; when mixed with distilled water, it throws down no precipitate with the nitrate of silver or chloride of barium. The specific gravity is 1·500. About 217 grains of the crystallized carbonate of soda are saturated by 100 grains of this acid.

The nitrate of silver refers to hydrochloric acid, or chlorine.

The chloride of barium is used to detect sulphuric acid.

Acidum Nitricum dilutum, dilute nitric acid, is prepared by mixing one part of acid with nine parts of water.

ACIDUM PHOSPHORICUM DILUTUM.

Dilute Phosphoric Acid.

Ingredients. Phosphorus, nitric acid, and distilled water.

Decomposition. The phosphorus abstracts from the nitric acid sufficient oxygen to form phosphoric acid, which is held in solution, whilst binoxide of nitrogen escapes, and, with oxygen of the air, forms nitrous acid fumes.

Great care is required in the process; for if the phosphorus be added to strong nitric acid, violent action will ensue, attended with combustion and explosion.

Composition of phosphoric acid.

5	oxygen	5 × 8	=	40
2	phosphorus	2 × 16	=	32
				72

Some chemists take the half, viz. 36, as the atomic number of phosphoric acid.

Qualities. Any precipitate produced in it by chloride of barium or nitrate of silver is dissolved by nitric acid. It has no effect upon copper or silver leaf; nor is it coloured by passing hydrosulphuric acid into it. The specific gravity of it is 1.064. 42 grains of crystallized carbonate of soda are saturated by 100 grains of this acid.

Chloride of barium, as usual, refers to sulphuric acid.

Nitrate of silver is a test for hydrochloric acid.

Hydrosulphuric acid relates to metallic impregnations.

ACIDUM SULPHURICUM DILUTUM.

Dilute Sulphuric Acid.

Composition. One ounce and a half of sulphuric acid, and fourteen ounces and a half of water.

SULPHURIC ACID is now obtained largely by burning sulphur to form sulphurous acid gas, which is brought into contact with nitric acid, evolved by pouring oil of vitriol upon nitrate of potash. The nitric acid first parts with one equivalent of oxygen, to form sulphuric acid, and becomes nitrous acid: this nitrous acid, in its turn, gives one of oxygen to some more sulphurous acid, and becomes hyponitrous acid; and the hyponitrous acid, by giving one of oxygen to the sulphurous acid, becomes binoxide of nitrogen; which, with oxygen of the air and of chamber forms nitrous acid again. During this process, there is steam constantly entering the chamber, and which, by condensation, holds the sulphuric acid in solution, and collects at the bottom of the chamber, from which it is drawn off by stop-cocks.

The changes may be thus represented:

Atmosphere. $O^2 + S = S\,O^2$

then,

$$SO^2 + NO^5 = SO^3 + NO^4;$$

afterwards,

$$SO^2 + NO^4 = SO^3 + NO^3;$$

lastly,

$$SO^2 + NO^3 = SO^3 + NO^2.$$

When the acid is drawn off, it is tested, to ascertain its strength, which may be known by its saturating power and specific gravity.

Qualities. Free from colour. Specific gravity 1.845.

Sulphuric acid is seldom quite pure: it generally contains a small quantity of sulphate of lead, which is detected when this acid is diluted with water, throwing down a white precipitate; or may be discovered by passing hydro-sulphuric acid through the liquid. If the specific gravity be below 1.845, too much water is present, and may be expelled by evaporation, in dishes made of platinum, silver, lead, or glass; if the weight be greater, it will be owing to the presence of sulphate of lead, or possibly sulphate of potash, from which it should be separated by distillation.

Sulphuric acid frequently contains an oxide of nitrogen, and not unfrequently some arsenic.

Composition of sulphuric acid.

3 oxygen 3 × 8 = 24
1 sulphur = 16
Dry sulphuric acid 40
The strongest liquid sulphuric acid contains 1 water = 9
49

Sulphuric acid with half an equivalent of water may be obtained by a process of distillation from the sulphate of iron, and is known as Nordhausen, or dihydrated sulphuric acid; and from this, anhydrous sulphuric acid may be procured in a solid form.

ACIDUM TARTARICUM. *Tartaric Acid.*

Ingredients. Bitartrate of potash, boiling water, prepared chalk, dilute sulphuric acid, hydrochloric acid.

Decomposition. When the bitartrate of potash and half the chalk are boiled in water they are both decomposed, the bitartrate surrendering one equivalent of its acid to the lime, forming a tartrate of lime, which falls to the bottom; carbonic acid escapes, and a tartrate of potash remains in solution. The solution of tartrate of potash instead of being rejected, is preserved to yield its tartaric acid also. This is accomplished by adding the hydrochloric acid to the rest of the chalk ordered, when decomposition ensues; the chlorine with the calcium forms a chloride of calcium in solution, the hydrogen of the acid and oxygen of the lime form water, and carbonic acid is evolved; on the addition of this solution of chloride of calcium to the solution of tartrate of potash, fresh chemical changes occur; the chloride of calcium and tartrate of potash decompose each other; the chlorine with potassium forms a chloride of potassium, the oxygen of the potash passes to the lime, with which the tartaric acid combines, forming tartrate of lime. In this way the tartaric acid is all transferred from the potash to the lime: when sulphuric acid is added to the washed tartrate of lime, sulphate of lime is formed, and tartaric acid is set free, and, by evaporation, is procured in crystals.

Qualities and tests. It is totally soluble in water; this solution produces a precipitate of bitartrate with any neutral salt of potash. If the precipitate produced in this solution by acetate of lead be insoluble in dilute nitric acid, it indicates that sulphuric acid is present.

Composition.

4 carbon 4 × 6 = 24
5 oxygen 5 × 8 = 40
2 hydrogen 2 × 1 = 2

Atomic number 66

The crystallized acid contains one equivalent of water. Atomic number, 75.

ETHERS.

ÆTHER SULPHURICUS. *Sulphuric Æther.*

Ingredients. Rectified spirit, sulphuric acid, and carbonate of potash previously dried.

Decomposition. The chemical changes in this preparation are not uniformly agreed upon by chemists. The explanation of the change given by Liebig is the following: two equivalents of sulphuric acid act upon one of alcohol, and yield three equivalents of water and one of the bisulphate of the oxide of ethule. By continuing the heat, the latter is decomposed, and resolved into one equivalent of the oxide of ethule or ether, and two equivalents of sulphuric acid.

Alcohol, according to Liebig is a hydrated oxide of ethule.

	carb.	hydr.	oxyg.		at. n.
Ethule is composed of	4	5		=	29
Ether ,,	4	5	1	=	37
Alcohol ,,	4	6	2	=	46

The formation may be thus represented :

1 alcohol 46 × 2 sulphuric acid 98
yield,
3 water 27 + 1 bisulphate of oxide of ethule 117.

The bisulphate becomes, by decomposition, resolved into,

1 oxide of ethule or ether,
2 sulphuric acid.

The carbonate of potash used is employed in the rectification process, to saturate any acid, and to facilitate the separation of the ether from the water, with the latter of which it unites.

Qualities. The specific gravity is .750. The ether sold in the shops varies from .733 to .765. It entirely passes into vapour by gentle heat; has often a slight action upon litmus paper, depending upon the formation of a little acetic acid in it: it unites and mixes with water, in the proportion of one fluid ounce to ten fluid ounces of water. Being very volatile, it requires to be kept in very carefully stopped bottles.

OLEUM ÆTHEREUM. *Ethereal Oil.*

Ingredients. Rectified spirit, sulphuric acid, solution of potash and distilled water.

Decomposition. Heavy oil of wine (ethereal oil) is produced when alcohol is distilled with a considerable excess of sulphuric acid, as 1 part spirit to $2\frac{1}{2}$ parts acid. Some ether is produced at the beginning of the process. It has a sweet aromatic odour and burning taste, is heavier than water, and not sensibly soluble in that liquid. In alcohol and ether it dissolves freely.

Oil of wine contains the elements of sulphuric acid in combination with carbon, hydrogen and oxygen; it is supposed to be a compound of neutral sulphate of ether with the sulphate of a hydrocarbon, isomeric with olefiant gas, to which the name *etherole* is given.

$$C_4 H_5 O, SO_3 \times C_4 H_4 SO_3$$

By contact with boiling water it is resolved into sulphovinic acid and *light oil of wine;* the latter is the etherole itself, holding in solution a crystallizable substance, of similar composition, which it gradually deposits in a cool place.

In the process of the Pharmacopœia, the ether vaporizes by exposure to the air: the potash is added to absorb any sulphurous acid.

Qualities. It is a liquid of a yellow colour, with a peculiar aromatic odour, with rather a sharp taste: it is not sensibly soluble in water, is entirely dissolved by sulphuric ether, and produces no acid reaction upon litmus paper. Its specific gravity is 1.050.

SPIRITUS ÆTHERIS NITRICI.

Spirit of Nitric Ether.

Ingredients. Nitric acid, rectified spirit.

Decomposition. The nitric acid and part of the spirit decompose each other, and the products are hyponitrous acid and ether, which pass over with some undecomposed alcohol into the receiver, and we have remaining in the retort some new compounds, consisting of oxalic, formic, and acetic acids, produced by the union of oxygen, from the nitric acid, and the hydrogen and carbon of the spirit.

Composition.

1 hyponitrous acid = 38
1 ether = 37
Atomic number 75

Qualities. Colourless: its specific gravity is .834: it slightly reddens litmus paper. When carbonate of soda is added to it no bubbles of carbonic acid are evolved, proving the absence of free acid. It is distinguished by its peculiar rather pleasant odour. It generally gives a blue colour to guaiacum, and an olive-green to the protosulphate of iron, showing the presence of an oxide of nitrogen.

SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS.

Compound Spirit of Sulphuric Ether.

Ingredients. Sulphuric ether, rectified spirit, and ethereal oil.

The advantages of this compound is that it is miscible in water, and very convenient for dispensing.

ALKALINA. ALKALINE PREPARATIONS.

The alkaline preparations of the Pharmacopœia embrace not only the true alkalies, but also the alkaline bases of vegetables, which have been named *alkaloids* for the sake of distinction.

The real alkalies are generally distinguished by possessing an urinous taste, a soapy feel and peculiar effects upon vegetable colours, turning reds to blue, some blues to green, and yellow to brown. Turmeric paper (which is yellow) is commonly used to ascertain the presence of an alkali, being turned brown by them.

The alkaloids exist in plants, associated with an acid, which renders them soluble in water. In a free state, the alkaloids are scarcely in any degree soluble in water, sparingly soluble in cold alcohol, but freely soluble in hot alcohol. To remove the colouring matter from them, animal charcoal is used, and always when they are in solution, combined with an acid. In preparing the alkaloids, the vegetable substances are generally acted upon by spirit and water separately, in order to remove the gum and resin; thus, when nux vomica is digested in spirit, the resin and strychnate of strychnia are dissolved, and the gummy matter is left behind: when this alcoholic solution is distilled, and the spirituous extract is treated with water, the strychnate of strychnia is dissolved, and the resin is left behind; then either an alkali or an acid may be used to separate the constituents of the natural salt.

The alkaloids are compounds of oxygen, hydrogen, nitrogen, and carbon; excepting nicotine, which contains no oxygen; and possibly conia may be classed with it.

ACONITINA. *Aconitine.*

Ingredients. Aconite root, rectified spirit, dilute sulphuric acid, solution of ammonia, and animal charcoal.

Decomposition. By boiling the aconite root repeatedly in spirit, all the active matter is dissolved, and by distilling the spirit away, and then treating the residue with water, the gum and resin are both removed; sulphuric acid is then added, which combines with the aconitine to form a sulphate of aconitine in solution. To this, ammonia is added, which, by uniting with the sulphuric acid, forms a soluble sulphate of ammonia, and the free aconitine is precipitated. The precipitate is then again dissolved by dilute sulphuric acid, and shaken up with animal charcoal to remove the colour, and ammonia is a second time added to precipitate the aconitine in a pure state.

Qualities. White, slightly crystalline; very soluble in sulphuric ether, less in alcohol, and least in water. By a high temperature it is decomposed, and flies off, leaving no solid impurity or adulterating matter.

The atomic composition of aconitine is unknown.

AMMONIÆ SESQUICARBONAS.

Sesquicarbonate of Ammonia.

Ingredients. Hydrochlorate of ammonia and chalk.

Decomposition. When the above are mixed and heated together, they mutually decompose each other; the chlorine combines with the calcium to form chloride of calcium, which remains in the retort; the oxygen of the lime, with the hydrogen of the acid, forms water, which rises in combination with the carbonic acid and ammonia, forming the hydrated sesquicarbonate of ammonia.

Composition.

$1\frac{1}{2}$ carbonic acid	=	33
1 ammonia .	=	17
1 water .	=	9
		59

This compound is probably a mixture or compound of the carbonate and bicarbonate.

This preparation would be a simple hydrated carbonate of ammonia if it were possible to make the apparatus sufficiently close to prevent the escape of some ammonia and water, whereby an increased proportion of carbonic acid results.

Qualities. This salt is white and semi-transparent; in the air it passes into a powder by losing water, and by heat is entirely volatilized; it is soluble in water, and turns turmeric paper brown; when it has been saturated by nitric acid, it throws down no precipitate with chloride of barium or nitrate of silver, thus proving the absence of sulphuric and hydrochloric acids.

The solution of sesquicarbonate of ammonia contains four ounces of the salt dissolved in a pint of water. It is not a very desirable preparation, as it is likely to become weak by keeping.

Liquor Ammoniæ. *Solution of Ammonia.*

Ingredients. Hydrochlorate of ammonia, lime, and water.

Decomposition. The hydrochloric acid and lime decompose each other, forming a chloride of calcium and water, and ammonia is set free in solution; thus we have in the retort the water first put in, the water just formed, chloride of calcium and water; when heat is applied, the ammonia passes over with some water into the receiver, chloride of calcium and some water remaining behind.

Liquor ammoniæ is a solution of ammoniacal gas in water, and the water contains about 500 times its volume of the gas, or 10 per cent. by weight. The liquor ammoniæ fortior contains about 780 times its volume of ammoniacal gas.

Composition of ammonia.

3 hydrogen 3 × 1 = 3
1 nitrogen = 14
17

Qualities. By heat it passes entirely into a volatile vapour, possessing strong alkaline properties; it throws down no precipitate with lime water, nor when it has been saturated with nitric acid does it throw down a precipitate with sesquicarbonate of ammonia or nitrate of silver. The specific gravity is .960.

In the above, the lime water refers to carbonic acid. The sesquicarbonate of ammonia refers to lime, and nitrate of silver refers to hydrochloric acid, or chlorides.

The specific gravity of liquor ammoniæ fortior is .882, and by mixing one ounce of it with three ounces of water, a liquid is formed of the same strength as liquor ammoniæ.

LIQUOR AMMONIÆ ACETATIS.

Solution of Acetate of Ammonia.

Ingredients. Sesquicarbonate of ammonia and distilled vinegar.

Decomposition. The acetic acid combines with the ammonia, forming an acetate of ammonia in solution, setting free the carbonic acid, which escapes with effervescence.

We know that the ammonia is saturated, either by test papers not being affected, or by dropping in a little acetic acid, or sesquicarbonate, and no effervescence taking place. Litmus paper may be slightly reddened by this solution if some free carbonic acid be present.

Qualities. It is not coloured by hydrosulphuric acid, nor does it throw down a precipitate with nitrate of silver or chloride of barium. The solution being evaporated, the residue by heat gives off ammonia, and is entirely dispersed.

Hydrosulphuric acid refers to metallic impregnation, nitrate of silver to hydrochloric acid, and chloride of barium to sulphuric acid. The application of heat refers to any fixed alkaline or earthy bases.

MORPHIA. *Morphia.*

Ingredients. Hydrochlorate of morphia, solution of ammonia, and water.

Decomposition. Hydrochloric acid unites with the ammonia, forming a soluble hydrochlorate of ammonia, and the morphia which is set free is precipitated.

Properties. White, in small crystals; almost insoluble in cold water, soluble in 100 parts of boiling water; tinges turmeric paper brown; soluble in 40 parts of cold alcohol; is decomposed by a high temperature, and is entirely dissipated; nitric acid dropped upon it, first turns it red, afterwards yellow; the tincture of sesquichloride of iron gives a blue colour to it. Chlorine turns its salts brown, if ammonia be subsequently added; and, on the addition of more chlorine, the colour disappears. Morphia is precipitated from its salts by solution of potash, by which it may be redissolved, if added in excess.

Iodic acid is a test of morphia; being decomposed by it, and the iodine set free, will produce its characteristic blue colour with a solution of starch.

Morphia is not used medicinally by itself, but is ordered to be kept to make the salts of morphia when they are wanted, since morphia is less prone to decomposition than its salts by long keeping.

Composition of morphia.

34 carbon	34 × 6	= 204
18 hydrogen	18 × 1	= 18
6 oxygen	6 × 8	= 48
1 nitrogen		= 14
	Equivalent	284

MORPHIÆ ACETAS. *Acetate of Morphia.*

Ingredients. Morphia, acetic acid, and water. In this preparation the morphia is neutralized by acetic acid, evaporated and crystallized; the acetate of morphia thus formed is very soluble in water, and very convenient for medical purposes. It is liable to decomposition by long keeping, and should, therefore, be prepared only in small quantities at a time.

MORPHIÆ HYDROCHLORAS.
Hydrochlorate of Morphia.

Ingredients. Sliced opium, crystals of chloride of lead, animal charcoal, hydrochloric acid, water, and solution of ammonia.

Decomposition. By macerating opium repeatedly in water, the active matter is dissolved, containing meconic acid, morphia, and codeia, in combination; to this solution chloride of lead is added, having been previously dissolved in boiling water; when these are mixed, chloride of lead and water decompose each other, forming hydrochloric acid and oxide of lead, and the meconic acid falls with the lead as a meconate of lead, whilst the hydrochloric acid holds in solution the morphia and codeia. The solution is then poured off and submitted to evaporation, that part of the hydrochlorate of morphia may crystallize; the liquid is next poured off from the crystals, still containing some hydrochlorate of morphia and all the codeia; to this, ammonia is added, which combines with the hydrochloric acid, forming hydrochlorate of ammonia in solution; morphia is precipitated, but the codeia remains dissolved; thus, by using ammonia, we completely separate the morphia from the codeia. The precipitated morphia is next treated with dilute hydrochloric acid to saturation, and mixed with the crystals of hydrochlorate of morphia previously crystallized; to the solution, animal charcoal is added to remove any colour, and afterwards, by evaporation, all the hydrochlorate of morphia is obtained in crystals.

Composition.

1 morphia . = 284
1 hydrochloric acid = 36

320

Qualities. The crystals are beautifully white, feathery, and acicular. The solution throws down, by the nitrate of silver, chloride of silver, which is soluble in an excess of ammonia, but not in hot nitric acid.

Quinæ Disulphas. *Disulphate of Quina.*

Ingredients. Yellow cinchona bark, sulphuric acid, animal charcoal, hydrated oxide of lead, solution of ammonia, and distilled water.

Decomposition. By boiling the bark, acid, and water together, we obtain in solution a sulphate of quina, kinic acid, and colouring matter; when the oxide of lead is added to this, the sulphuric acid leaves the quina and combines with the oxide of lead, forming an insoluble sulphate of lead, which is precipitated, and the kinic acid combines with the quina to form a soluble kinate of quina; when to this solution ammonia is added, the kinic acid leaves the quina, and with the ammonia forms a soluble kinate of ammonia, and the quina is set free and precipitated; the quina is next treated with sulphuric acid, and the solution is decolorized with charcoal, and, by evaporation, disulphate of quina is obtained in crystals.

Composition of crystals of the disulphate.

1 sulphuric acid		=	40
2 quina	2 × 162	=	324
8 water	8 × 9	=	72
	Equivalent		436

Quina is composed of

20 carbon	20 × 6	=	120
12 hydrogen	12 × 1	=	12
2 oxygen	2 × 8	=	16
1 nitrogen	.	=	14
	Atomic number		162

Qualities. It is entirely dissolved by water, especially if a little acid be present; by heat it gives off about 9 per cent. of water. If quina be precipitated by ammonia, and the solution be evaporated, it should not present a sweet taste, proving that sugar has not been used to adulterate it. If chlorine be applied to it, and afterwards ammonia, it turns green; by a high temperature it is entirely dispersed, showing the absence of any earthy adulteration.

STRYCHNIA. *Strychnia or Strychnine.*

Ingredients. Nux vomica, rectified spirit, sulphuric acid, magnesia, and solution of ammonia.

Decomposition. By boiling nux vomica in spirit and water separately, the active matter is taken up freed from both gum and resin, and we have remaining a strychnate of strychnia dissolved in a little water; to this magnesia is added, which combines with the acid, forming a strychnate of magnesia, and strychnia is set free, and is taken up by hot spirit, from which it is procured by distillation; it is next dissolved in dilute sulphuric acid, forming a sulphate of strychnia, from which it is subsequently separated by ammonia, which produces a soluble sulphate of ammonia, and pure strychnia is precipitated.

Composition.

30 carbon 30 × 6 = 180
16 hydrogen 16 × 1 = 16
3 oxygen 3 × 8 = 24
1 nitrogen . = 14

Equivalent 234

Qualities. It crystallizes and is colourless; sparingly soluble in water, exceedingly bitter, imparting a bitter taste to 600,000 times its volume of water; is much more soluble in hot alcohol; by heat it melts, and at a high temperature is decomposed and flies off. Common strychnia of the shops is reddened by nitric acid, owing to the presence of brucia and colouring matter.

VERATRIA. *Veratria or Veratrine.*

Ingredients. Sabadilla, rectified spirit, dilute sulphuric acid, solution of ammonia, animal charcoal, and magnesia.

Decomposition. After boiling in spirit and water to dissolve out the active matter, sulphuric acid is added, which unites with the veratria, forming a sulphate of veratria in solution; to this magnesia is added, which unites with the acid to form a sulphate of magnesia, and veratria is precipitated. The veratria is again taken up by dilute sulphuric acid, and is then treated with charcoal to remove the colour; and lastly, the veratria is a second time precipitated by adding ammonia.

Composition.

34 carbon	34	×	6	=	204
22 hydrogen	22	×	1	=	22
6 oxygen	6	×	8	=	48
1 nitrogen		.		=	14
					288

Qualities. It does not crystallize, is in the form of a white powder, almost insoluble in water, readily dissolved by alcohol and sulphuric ether; it is inodorous, but has a bitter taste, and is reddened by sulphuric acid.

CARBO ANIMALIS PURIFICATUS.

Purified Animal Charcoal.

Animal charcoal, as first obtained, contains some phosphate and carbonate of lime. These are removed by the hydrochloric acid which acts upon them, forming a chloride of calcium, super-phosphate of lime water, and carbonic acid, which flies off; by washing, all the acid and salts are removed. This is the best variety of charcoal for decolorizing purposes.

CORNU USTUM. *Burnt Horn.*

Horn contains animal and earthy matter; by the heat applied, the gelatine is decomposed, and expelled in the form of ammonia, carbonic acid, oily matter, and water, leaving behind phosphate of lime, with a little carbonate of lime.

TESTÆ PRÆPARATÆ. *Prepared Shells.*

This is merely a variety of carbonate of lime, with a small quantity of animal matter, and is obtained in a very fine powder by a process named elutriation.

AQUÆ DESTILLATÆ. DISTILLED WATERS.

SIMPLE distilled water is obtained by subjecting common river or spring water to boiling heat, and distilling over a large portion of it; the first two pints are thrown away on account of containing some gases, vegetable aroma, or other light impurities, and a part is left on account of its containing the earthy impurities.

In spring and river water we frequently find lime, in the state of sulphate or supercarbonate, and sometimes a little chloride of sodium. The application of heat alone will cause a deposit of lime by expelling the excess of carbonic acid, which rendered the carbonate of lime soluble, and will throw down the sulphate by the quantity of water being reduced below what is necessary for its solution.

Lime may readily be detected by oxalate of ammonia, or oxalic acid, which will form a white insoluble oxalate of lime.

Sulphuric acid may be discovered by adding any soluble salt of baryta, which will form an insoluble sulphate of baryta.

Any soluble chloride may be detected by adding nitrate of silver, which will produce an insoluble white chloride of silver.

Carbonic acid may be detected by lime water, producing a precipitate of carbonate of lime, soluble in acetic acid.

Aromatic distilled waters are obtained either by using the seeds or fruit, the fresh or the dried plant, the bark, (as in cinnamon water,) or the distilled oil itself.

DILL, CARAWAY, and FENNEL WATER are procured from the seeds; a little proof spirit is used in the process, to protect the water subsequently from decomposition.

ORANGE-FLOWER WATER is distilled from the flowers.

CINNAMON WATER is distilled either from the bark or from a small portion of the oil.

PEPPERMINT, SPEARMINT, and PENNYROYAL WATERS are distilled from the entire plant, either dried or fresh; when the fresh plant is used, we employ a double quantity, on account of the water present adding so much to its weight.

PIMENTA WATER is distilled from either the fruit or a small portion of the oil.

ROSE WATER is obtained from the dried petals of the *rosa centifolia.*

ELDER-FLOWER WATER may be procured from the flowers.

Some artificial waters, or imitations of distilled water may be easily obtained, where there is not the convenience of a still, by rubbing carefully a drachm of any of the distilled oils with a drachm of carbonate of magnesia, and afterwards with four pints of distilled water, finally straining the water. The objection to this process is, that a portion of the magnesia is dissolved, and serves to suspend the oil.

Elder-flower water cannot be made from the oil, although so ordered in the 'London Pharmacopœia.'

CERATA. CERATES.

Cerates are unctuous compounds, possessing a harder consistence than ointments, and most convenient for use in hot weather. They all (as their name implies) contain wax.

Ceratum Calaminæ. *Turner's Cerate.*

In making this, the calamine should be added when the cerate is beginning to cool and become thick, otherwise all the calamine would sink to the bottom.

Ceratum Cantharidis.

In making this, the cantharides are not exposed to much heat, otherwise their activity would be impaired.

Ceratum Saponis.

In making this, some care is required in not boiling the ingredients too rapidly, and not applying too much heat. When properly prepared, it is a very useful cooling application; but when badly prepared, becomes acrid and highly irritating to abraded surfaces.

CONFECTIONES. CONFECTIONS.

CONFECTIO AMYGDALÆ. *Almond Confection.*

THE skins of the almonds are ordered to be removed after maceration in cold water. This can be done more readily by pouring boiling water upon them; but when so treated they lose a portion of their oil, and certainly are more prone to become mouldy. The ingredients are ordered to be kept dry and mixed, and when ordered are to be rubbed up with water, forming a pleasant white emulsion.

CONFECTIO AROMATICA. *Aromatic Confection.*

The ingredients of this are now ordered to be kept in the state of powder, in consequence of fermentation taking place when they are kept in a moist state with water.

CONFECTIO OPII. *Confection of Opium.*

This aromatic preparation of opium is likewise ordered to be kept in the state of powder, and to be rubbed up with water when required.

CONFECTIO PIPERIS NIGRI.
Confection of Black Pepper.

This preparation is best kept in the state of powder.

Confectio Rosæ Caninæ.
Confection of Dog-rose, (Conserve of Hips.)

This conserve is extremely useful in pharmacy for giving pills a proper consistence.

Confectio Rosæ Gallicæ.
Confection of Red Rose.

In making this the fresh petals are employed.

Confectio Rutæ. *Confection of Rue,*
and
Confectio Scammonii. *Confection of Scammony,*

Are both preserved best in the form of powder.

Confectio Sennæ.
Confection of Senna, (Lenitive Electuary.)

This preparation requires much care and patience in making, and as, from the number of ingredients ordered, some may be omitted without easy detection, it is seldom found in the shop as genuine as it should be.

DECOCTA. DECOCTIONS.

DECOCTIONS are aqueous preparations, in which it is necessary to apply heat for some time, in order to extract principles which would not be taken up by simple infusion. Decoction is not applicable to substances which owe their virtues to volatile principles, such as aromata and volatile oils. They are liable to decomposition by long keeping, and most of them should be prepared only when ordered. The compound decoction of aloes, however, is an exception, for it will keep good for many weeks.

DECOCTUM CINCHONÆ. *Decoction of Bark.*

Is to be strained whilst hot, and on cooling will yield a deposit. Whenever this decoction is ordered. it is to be shaken up and admistered in a turbid state. Infusion of cinchona is quite clear, without any sediment.

DECOCTUM SARZÆ. *Decoction of Sarsaparilla.*

Is prepared rather differently from the other decoctions. The root is first put into boiling water, and placed near the fire to macerate for four hours; next taken out to be bruised in a mortar, and then returned to the liquid; then to be macerated for two hours longer; and finally to be boiled down to the proper quantity and strained.

EMPLASTRA. PLASTERS.

Plasters are external applications containing some adhesive substances by which they may be retained in contact with the body. They are made to combine by the assistance of heat, and are usually melted and spread upon linen or leather, when they are ordered for use. The particular plasters which require any separate notice are the following:

Emplastrum Ammoniaci.

Ammoniacal Plaster.

Is made by heating and dissolving ammoniacum in distilled vinegar, and evaporating to a proper consistence.

Emplastrum Ammoniaci cum Hydrargyro.

Ammoniaco-mercurial Plaster.

In this plaster the sulphur is first taken up by the heated oil, and then rubbed with the mercury till globules disappear, and subsequently thoroughly mixed and incorporated with the ammoniacum. In a like manner the Emplastrum Hydrargyri is prepared.

EMPLASTRUM OPII. *Opium Plaster.*

In making this, the water is of service in dividing and distributing the opium through the mass; besides, as long as water is present the heat cannot rise above the boiling point. Water is also used in the Emplastrum Picis and Emplastrum Plumbi, in both which cases it can only serve to keep a certain temperature.

ENEMATA. ENEMAS.

These require no particular remark, excepting the propriety of recollecting the proportions of opium and tobacco ordered in them.

EXTRACTA. EXTRACTS.

Extracts are vegetable juices generally of a consistence fit for making pills, sometimes kept in a dry state that they may be rubbed into powder. Their composition is various, consisting of the different principles which are soluble in the menstrua used; thus water may take up gum, extractive and colouring matter, the peculiar salts of them forming their active principles, tannin; and spirit would take up resinous matter, as occurs in preparing extract of jalap.

Many of the extracts are merely the inspissated expressed juices of the plant.

Several extracts are made by boiling the vegetable in water to make a decoction, and afterwards evaporating it to a proper consistence.

A few others are made by distinct modes of proceeding.

In preparing extracts generally, the water is to be evaporated by a water-bath, stirring with a spatula towards the end, till we obtain a proper consistence. A little rectified spirit should be sprinkled upon the softer extracts to prevent their becoming mouldy.

The following extracts are expressed juices:

Extractum Aconiti.
,, Belladonnæ.
,, Colchici.
,, Conii.
,, Digitalis.
,, Hyoscyami.
,, Lactucæ.

They are prepared in the following manner: Take the fresh plant, sprinkle a little water upon it, and bruize it in a stone mortar; then squeeze out the juice, by means of a strong press, and evaporate it (without straining) to a proper consistence. The lower the temperature employed in obtaining them the stronger and better they are likely to be. Some chemists have contrived to evaporate them in vacuo, by which the virtues of the plant are much preserved.

Extractum Aloes Purificatum.

Purified Extract of Aloes.

In this case aloes are macerated for three days in water, at a gentle heat, then strained and set by that the dregs may subside; the clear liquid is then poured off and evaporated to a proper consistence. By this process the resinous matter is removed, and we obtain a less heating and irritating form of aloes.

EXTRACTUM CINCHONÆ CORDIFOLIÆ.

Extract of Heart-leaved Cinchona.

This is prepared by boiling the bark in water down to a certain quantity, straining whilst hot, and boiling four times in a similar quantity and manner. All the solutions are then to be mixed together and evaporated till they become of a proper consistence.

The extracts of Cinchona Lancifolia, and the Cinchona Oblongifolia, are prepared in a similar manner.

EXTRACTUM COLCHICI ACETICUM.

Acetous Extract of Colchicum.

In making this, the fresh cormus is used, and bruised and sprinkled with acetic acid; then the juice is pressed out in an earthen vessel, not glazed with lead, on account of the acid, and evaporated to a proper consistence. The colchicia is supposed to be rendered more soluble by the acetic acid.

EXTRACTUM COLOCYNTHIDIS.

Extract of Colocynth.

This is made by decoction in water, and subsequent evaporation.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM.
Compound Extract of Colocynth.

In making this, the colocynth pulp is macerated in the spirit, at a gentle heat, for four days; then the solution is strained, and the aloes, scammony, and soap are added, and whilst evaporating, the cardamon seeds are mixed in. This extract is seldom prepared properly in consequence of the expense; and is very grossly adulterated.

EXTRACTUM ELATERII. *Extract of Elaterium.*

This is not an extract in the ordinary sense of the word, but a dried fæcula. It is obtained by slicing the ripe cucumbers into a sieve placed over a receiving glass vessel, and little or no pressure should be used. The juice thus strained is allowed to stand for some hours, during which time a fæcula subsides; the supernatant fluid should then be poured off, and the fæcula dried by a gentle heat is named Extract of Elaterium.

This drug being costly is often adulterated, most frequently by the addition of some flour or starch, in which case it is of a lighter colour than it should be. If it has a dark colour it shows that too much pressure was employed in procuring it, which caused mucilage and colouring matter to be mixed with it.

Extractum Gentianæ. *Extract of Gentian.*

This is made by macerating the root of gentian in water for 24 hours; then boiling down and straining whilst hot, and evaporating to a proper consistence.

By a similar proceeding the seven following extracts are procured.

Extractum Glycyrrhizæ.
,, Hæmatoxyli.
,, Lupuli.
,, Pareiræ.
,, Sarzæ.
,, Taraxaci.
,, Uvæ Ursi.

Extractum Jalapæ. *Extract of Jalap.*

The tuber of jalap contains resinous matter with which the purgative principle is chiefly combined, and also gum. In making this extract, the jalap is macerated first in spirits for four days, and then the spirituous solution is poured off into a bottle, and the residue is boiled in water like a decoction. These solutions are then to be strained separately, and the spirituous solution, for economy, is to be distilled, and the other to be evaporated to a proper thickness. The two are then to be mixed and kept either soft to make into pills, or dried and hardened that it may be rubbed into a powder.

EXTRACTUM OPII PURIFICATUM.
Purified Extract of Opium.

The opium is macerated for twelve hours in water, and then mixed up with a larger quantity and allowed to stand that the dregs may subside. The poured off solution is then evaporated to a proper consistence. Although the opium may be deprived of its impurities by this process, the heat applied causes it to lose some of its activity.

EXTRACTUM PAPAVERIS. *Extract of Poppy.*

This is made from the dry capsules, (the seeds being removed,) by boiling in water and then evaporating to a proper consistence.

EXTRACTUM RHEI. *Extract of Rhubarb.*

This is made by macerating rhubarb in water with a little spirit for four days, and subsequently evaporating to a proper consistence. The spirit is chiefly useful in preventing fermentation.

EXTRACTUM STRAMONII.
Extract of Stramonium, or Thorn-Apple.

This is the only extract made from seeds. They are first macerated in water for four hours, afterwards taken out, bruised, and returned to the liquid, which is then boiled down, strained and evaporated.

INFUSA. INFUSIONS.

Infusions, as the name implies, are preparations made by pouring water, generally boiling but in some instances cold, upon vegetable substances and allowing them to stand for some time; then pouring off the clear solution for use. Infusion is adapted to substances which contain some volatile aromatic principles, such as would be expelled by decoction, also mucilaginous, bitter, and astringent matter. They are prone to decomposition, and should always be recently prepared. The substance used should not be in a fine state of division, for if so the water will not penetrate between the particles, and the solution will be probably turbid.

The length of period for maceration varies in the preparations, and is shortest where the properties most depend upon volatile principles, and longest where it is desirable to take up extractive or mucilaginous matter.

Infusum Anthemidis is macerated for ten minutes.

Infusum Aurantii Comp. is macerated for a quarter of an hour.

Infusum Valerianæ is macerated for half an hour.

The following are macerated for one hour.

Inf. Catechu comp.
,, Gentianæ comp.
,, Sennæ comp.

The following are macerated for two hours.

Inf. Armoraciæ comp.
,, Calumbæ.
,, Caryophylli.
,, Cascarillæ.
,, Cuspariæ.
,, Pareiræ.
,, Quassiæ.
,, Rhei.
,, Simarubæ.

The following are macerated for four hours.

Inf. Digitalis.
,, Diosmæ.
,, Krameriæ.
,, Lini comp.
,, Lupuli.
,, Scoparii.
,, Serpentariæ.

The following are macerated for six hours.

Inf. Cinchonæ.
,, Rosæ comp.

LINIMENTA. LINIMENTS.

LINIMENTS are chiefly external applications, intended to be smeared over or rubbed upon parts.

LINIMENTUM AMMONIÆ. *Liniment of Ammonia.*

This is made with solution of ammonia and olive oil, shaken together so as to form an opaque soapy compound.

LINIMENTUM AMMONIÆ SESQUICARBONATIS.
Liniment of Sesquicarbonate of Ammonia.

This is also a soapy compound, but not so complete and not so powerful as the former.

METALLICA. METALLIC PREPARATIONS.

Alumen Exsiccatum. *Dried Alum.*

The alum is exposed to heat, by which it first melts, and then by the heat being continued the water is entirely expelled, the alum changing from a transparent state to a spongy opaque mass. If the heat be carried too high there is fear of driving off some of the sulphuric acid.

Composition of crystallized alum.

3	sulphate of alumina	3 × 58	= 174
1	sulphate of potash		= 88
25	water	25 × 9	= 225

Thus by drying alum will lose about 46 per cent. of its weight.

Qualities of alum. It is entirely dissolved in water. From this solution alumina is precipitated free from colour by adding to it potash or ammonia, and by which, when added in excess, it is again dissolved. This proves the absence of any uncombined earthy matter, also the absence of oxide of iron, which is frequently found in alum.

Liquor Aluminis Compositus.
Compound Solution of Alum.

Ingredients. Alum, sulphate of zinc, and water. There is no decomposition here, all the bases being combined with sulphuric acid.

PRÆPARATA EX ANTIMONIO.
PREPARATIONS OF ANTIMONY.

Antimonii Oxysulphuretum.
Oxysulphuret of Antimony.

Ingredients. Sesquisulphuret of antimony, solution of potash, distilled water, dilute sulphuric acid.

Decomposition. When the sesquisulphuret of antimony and solution of potash are boiled together, a portion of each is decomposed, the oxygen of the potash combining with antimony to form a sesquioxide of antimony, and the sulphur with potassium forming sulphuret of potassium, which, together with the undecomposed sesquisulphuret, are held in solution, by the aid of the free potash. When the sulphuric acid is added it seizes the potash, and the oxide with the sesquisulphuret of antimony are precipitated together, leaving sulphuret of potassium to account for; this decomposes some water, the oxygen uniting with the potassium forms potash, with which there is sufficient sulphuric acid to combine and form sulphate of potash in solution; whilst the hydrogen of the water combines with the sulphur to form hydrosulphuric acid, which flies off. The precipitated powder is then washed and dried.

Composition of 100 parts, according to Mr. Phillips.

Sesquioxide of antimony	12
Sesquisulphuret of antimony	76.5
Water . .	11.5
	100

Qualities. An orange-red powder, inodorous, with a slight taste; insoluble in water; the greater part being soluble in nitrico-hydrochloric acid.

ANTIMONII POTASSIO-TARTRAS.

Potassio-tartrate of Antimony. (Tartar Emetic.)

Ingredients. Sesquisulphuret of antimony, nitrate of potash, bitartrate of potash, hydrochloric acid, and distilled water.

Decomposition. In the first part of the process the object is to obtain protoxide of antimony. To accomplish this, the sesquisulphuret of antimony and nitrate of potash are ignited together, in which case part of the oxygen of the nitric acid combines with sulphur to form sulphuric acid, and this with the potash forms sulphate of potash, some oxygen also unites with the antimony forming an oxide of antimony, part of the sesquisulphuret remaining undecomposed: the hydrochloric acid is used to prevent the formation of free potash, or sulphuret of potassium, forming in either case a chloride of potassium. The residue is then washed to remove sulphate of potash and chloride of potassium, and we have left a mixture of sesquioxide of antimony and sesquisulphuret of antimony. This is next boiled in water with bitartrate of potash, in which case one equivalent of tartaric acid leaves the potash to combine with two equivalents of sesquioxide of antimony, forming a ditartrate of antimony in solution, together with tartrate of potash; the sesquisulphuret remaining free and precipitated. The solution is then poured off, evaporated, and produces crystals.

Composition.

2 tartaric acid	2 × 66 =	132
1 potash	=	48
2 sesquioxide of antimony	2 × 77 =	154
3 water	3 × 9 =	27
	Atomic number	361

Or may be described as a compound of
1 tartrate of potash,
1 ditartrate of antimony,
3 water.

Qualities. A white salt, semi-transparent, in the form of octohedrons; entirely soluble in water; without any bitartrate of potash adhering to the vessel. When hydrosulphuric acid is added, it throws down an orange-red precipitate; the solution throws down no precipitate by the chloride of barium or nitrate of silver. Nitric acid throws down a precipitate, which it redissolves if added in excess.

The above refer to,

1st. Free bitartrate of potash, sometimes mixed with it.

2d. Hydrosulphuric acid throws down a hydrated sulphuret of antimony.

3d. Chloride of barium shows the absence of sulphuric acid.

4th. Nitrate of silver proves the absence of chlorides.

5th. Nitric acid first separates some oxide of antimony, then, added in excess, redissolves it.

Vinum Antimonii Potassio-tartratis.

Antimonial Wine, or Wine of the Potassio-tartrate of Antimony.

This is now made by dissolving two scruples of the salt in a pint of sherry : thus the solution contains one grain in half an ounce.

If this preparation contain a crystalline deposit it indicates that the tartar-emetic was not pure, depending probably upon the adulteration with bitartrate of potash, and ought to be rejected.

Pulvis Antimonii compositus.

Compound Powder of Antimony.

Ingredients. Sesquisulphuret of antimony, and horn shavings.

Decomposition. When the above are heated in an open crucible, at a high temperature, the sulphur of the sulphuret takes fire, and with oxygen of the air forms sulphurous acid gas, which flies off, and the antimony attracts oxygen, forming an oxide of antimony. The horn shavings are also acted upon; the animal matter, viz. gelatine, is decomposed, and flies off in the form of carbonic acid, ammonia, oily matter, and water; the earthy matter remaining consisting chiefly of phosphate of lime. Thus the residue is a mixture of oxide of antimony and phosphate of lime. There are three compounds of antimony with oxygen: viz. sesquioxide of antimony, antimonious and antimonic acids. The sesquioxide is the most active medicinally; the other two being comparatively inert. In making the above preparation there is no mode of ensuring the formation of sesquioxide, and much more frequently we obtain antimonious acid, therefore the preparation cannot be depended upon; for when it contains the sesquioxide it is active, but when there is antimonious acid it is comparatively inert.

A specimen of the powder, analysed by Mr. Phillips, contained in 100 parts,

Antimonious acid	35
Phosphate of lime	65

Notwithstanding the statement of Mr. Phillips, it appears that some sesquioxide of antimony is generally present.

PRÆPARATA EX ARGENTO.
PREPARATIONS OF SILVER.

ARGENTI CYANIDUM. *Cyanide of Silver.*

Ingredients. Nitrate of silver, hydrocyanic acid, distilled water.

Decomposition. When these are mixed together mutual decomposition takes place, the cyanogen combines with the silver to form a cyanide of silver, which is precipitated; the oxygen of the silver unites with the hydrogen of the acid to form water, and the nitric acid is set free in solution. The solution is then poured off, and the cyanide of silver is evaporated and dried.

Composition.

1 cyanogen = 26
1 silver = 108
134

Qualities. A white powder, insoluble in water, but soluble in ammonia and in hot nitric acid; not changed by exposure to light; by heat is decomposed, giving off cyanogen gas and leaving metallic silver. It is used for obtaining hydrocyanic acid.

ARGENTI NITRAS.

Nitrate of Silver, (Lunar Caustic.)

Ingredients. Silver, nitric acid, and distilled water.

Decomposition. When mixed and heated together part of the nitric acid is decomposed, giving oxygen to the silver to form oxide of silver, which combines with the undecomposed acid and forms nitrate of silver in solution; binoxide of nitrogen is set free, and by meeting with oxygen of the air forms nitrous acid fumes. The solution is then evaporated, and by a high temperature the nitrate of silver is fused and poured into moulds.

The ordinary nitrate of silver is anhydrous.

The water used in the process is of service to keep down the temperature, to prevent an unnecessary escape of nitrous acid, to dissolve the nitrate as rapidly as it is formed, so that a fresh surface may be always exposed to the action of the acid.

Composition.

1 nitric acid = 54
1 oxide of silver = 116

170

Qualities. When first made it is white, but exposed to the light soon turns black. It is entirely soluble in water, and by copper introduced it deposits metallic silver. Chloride of sodium added to a solution of it throws down a white precipitate, which is dissolved by excess of ammonia, and the solution is colourless. If the chloride of silver be removed no colour should be produced in the solution by hydrosulphuric acid.

Nitrate of silver, by light and organic matter, loses part of its nitric acid, and the black oxide of silver is left; if the light be very strong we may have a part converted into metallic silver.

Copper introduced, having a greater affinity for oxygen and the acid, attracts them both, and the metallic silver is deposited upon the copper.

Chloride of sodium produces a chloride of silver insoluble in hot nitric acid, proving that it is not the cyanide.

The solution remaining colourless after ammonia is added proves the absence of copper.

Hydrosulphuric acid refers to any other metals that by chance it might be adulterated with.

Liquor Potassæ Arsenitis.

Solution of Arsenite of Potash, (Fowler's Solution.)

Ingredients. Arsenious acid, carbonate of potash, compound tincture of lavender, and distilled water.

Decomposition. The arsenious acid combines with the potash, forming arsenite of potash in solution, and carbonic acid is set free, and escapes with effervescence. The solution is coloured by compound tincture of lavender in order to prevent mistakes.

Barii Chloridum. *Chloride of Barium.*

Ingredients. Carbonate of baryta, hydrochloric acid and distilled water.

Decomposition. The chlorine unites with the barium forming a chloride of barium; the oxygen of the baryta combines with the hydrogen of the acid, forming water, and the carbonic acid escapes. The solution is then evaporated, and the chloride of barium is obtained in crystals.

Composition.

1 chlorine = 36
1 barium = 68
Atomic number 104

The crystals contain two equivalents of water.

Properties. The crystals are soluble in water, and the solution, treated with ammonia or hydrosulphuric acid, throws down no precipitate and is colourless, proving the absence of alumina, lead, iron, or copper. When this has been supersaturated by sulphuric acid, carbonate of soda throws down no precipitate, thus proving that lime is not present.

Chloride of barium is principally employed as a test for sulphuric acid, with which it will form an exceedingly insoluble sulphate of baryta. The solution ordered in the Pharmacopœia is convenient for this purpose.

BISMUTHI TRISNITRAS. *Trisnitrate of Bismuth.*

Ingredients. Bismuth, nitric acid, and distilled water.

Decomposition. When the bismuth, nitric acid, and part of the water are mixed together, part of the nitric acid is decomposed, giving oxygen to the bismuth to form the oxide, with which undecomposed nitric acid combines to form nitrate of bismuth, binoxide of nitrogen is set free, and with oxygen of the air forms nitrous acid fumes. When the rest of the water is added to the nitrate it becomes decomposed and resolved into ternitrate and trisnitrate of bismuth; the latter, being insoluble, is precipitated, washed and dried.

Nitrate of bismuth is remarkable as being the only nitrate which is decomposed by water.

Composition of the trisnitrate.
1 nitric acid = 54
3 oxide of bismuth 3 × 80 = 240
294

Qualities. It is a white powder, without smell or taste, blackened by contact with hydrosulphuric acid; entirely dissolved in nitric acid, without effervescence, showing that no carbonate is mixed with it; and the solution throwing down no precipitate with sulphuric acid shows the absence of lead.

CALX. LIME.

Fresh-burnt Lime. Quicklime. Unslaked Lime.

Substance used. Chalk.

The chalk is to be broken into pieces and burnt in a very brisk fire, to expel the carbonic acid, and leave the lime free.

Looking at the atomic composition of chalk, 100 parts by burning ought to lose 44 parts of carbonic acid, 56 of lime remaining.

Qualities. A white substance, easily pulverized, with a caustic alkaline taste; exposed to the air it gradually crumbles, and absorbs water and carbonic acid, thus returning to the state of carbonate: when water is poured upon lime great heat is evolved, in consequence of part of the water passing into a solid state, and uniting with the lime to form a hydrate. It is dissolved in hydrochloric acid without effervescence, showing the absence of the carbonate, and the solution throwing down no precipitate on the addition of ammonia proves the absence of alum and iron.

Liquor Calcis. *Solution of Lime*, (*Lime-water.*)

Ingredients. Lime and distilled water.

Chemical action. The lime is first slaked with a little water, afterwards the rest is poured upon it. During this time heat is evolved, and bubbles of steam escape from the liquid; it is then covered over for three hours and allowed to stand; afterwards stirred up to be made turbid, and in that state poured into bottles, where it is to be kept carefully stoppered.

In this preparation more lime is used than the water can dissolve; and the object of keeping an excess of lime is that the water may always be saturated; for each time that some of the lime-water is taken out atmospheric air enters the bottle, and with it carbonic acid, which unites with the lime of the solution, forming an insoluble carbonate; and if there were not an excess of lime the latter part of the water would be found quite free from lime.

Lime is dissolved most abundantly by cold water, in opposition to most other substances; thus

A pint of water at 212 dissolves 6.7 grains.
,, ,, 60 ,, 11.6 ,,
,, ,, 32 ,, 13.25.

Qualities. Colourless, inodorous, but with an alkaline unpleasant taste; has an alkaline action on test papers; forms a soapy compound with the fixed oils, in which form it is sometimes employed for burns; exposed to the air a pellicle is seen soon to form on the surface, and then gradually falls to the bottom, and this is carbonate of lime.

CALCII CHLORIDUM. *Chloride of Calcium.*

Ingredients. Chalk, hydrochloric acid, and distilled water.

Decomposition. The acid and chalk decompose each other, the chloride combining with the calcium to form chloride of calcium, the oxygen with the hydrogen forms water, and carbonic acid flies off; by the heat afterwards all the water is expelled, and we obtain chloride of calcium in an anhydrous state.

Composition.

1 chlorine =	36
1 calcium =	20
Atomic number	56

Qualities. Colourless, translucent, hard, and friable, entirely soluble in water: the solution of it produces no precipitate with ammonia, chloride of barium, or ferrocyanide of potassium, when much diluted; thus proving the absence of alumina, sulphuric acid, and iron.

CALX CHLORINATA.

Chlorinated Lime, (Chloride of Lime.)

Ingredients. Hydrate of lime and chlorine.

Chemical action. The chlorine is introduced into a glass vessel containing the lime until the latter is saturated, which is known by the chlorine existing in a free state over the lime. The mode in which the chlorine unites with the lime is not agreed upon by chemists; some consider it as a compound of the two. Looking to it theoretically, the most probable state and most intelligible is that it is a combination of chloride of calcium and hypochlorite of lime.

The chlorine employed here is procured by mixing together hydrochloric acid and binoxide of manganese, in which case two equivalents of the acid act upon one equivalent of the binoxide; the two of hydrogen uniting with the two of oxygen to form two equivalents of water; one of chlorine combines with the manganese, forming chloride of manganese; and one equivalent of chlorine is liberated.

Qualities. Of a white colour, sometimes assuming a brownish tint; of a very unpleasant smell; partially soluble in water, with a deposit of lime; soluble in hydrochloric acid, with an evolution of chlorine.

CRETA PRÆPARATA. *Prepared Chalk.*

Ingredients. Chalk and water.

Process. The chalk is first rubbed with a little water, then stirred up with a large quantity and allowed to stand a few minutes, that the large coarse particles may fall. The turbid liquid is then poured off into another vessel and allowed to stand, and the chalk falls to the bottom in a minute state of division. The water is poured off, and the powder is dried.

This process is called elutriation, and is employed in preparing calomel, prepared shells, and burnt horn.

Composition.

1 carbonic acid = 22
1 lime = 28
50

Tests. The whole of it is dissolved by hydrochloric acid with effervescence; when the solution has been boiled it throws down no precipitate by dropping in ammonia: its solubility in the acid shows the absence of silica; ammonia proves the absence of alumina or oxide of iron.

Cupri Ammonio-sulphas.

Ammonio-sulphate of Copper.

Ingredients. Sulphate of copper and sesquicarbonate of ammonia.

Decomposition. When these are rubbed together double decomposition takes place; the sulphuric acid combining with ammonia forms sulphate of ammonia, and carbonic acid unites with the oxide of copper to form carbonate of copper, some carbonic acid escaping; and there is also remaining some undecomposed sesquicarbonate of ammonia.

Some remarkable changes occur in this process, viz. at first a greenish colour is produced, the mixture becomes moist, it effervesces, and finally turns of a beautiful blue colour, and has a strong ammoniacal odour.

Qualities. By the application of heat ammonia is given off, and oxide of copper is left; it possesses an alkaline reaction, and produces a green precipitate with a solution of arsenious acid.

PRÆPARATA E FERRO.
PREPARATIONS OF IRON.

Ferri Sulphas.

Sulphate of Iron, Green Vitriol, Copperas.

Ingredients. Iron filings, sulphuric acid, water.

Decomposition. Some water is decomposed, its oxygen with the iron forms oxide of iron, which immediately unites with the sulphuric acid, and hydrogen gas is evolved. By evaporation the sulphate of iron is procured in crystals.

Composition.
1 sulphuric acid = 40
1 protoxide of iron = 36
7 water 7 × 9 = 63
139

Qualities. When pure it has a blue tinge; after a little time it becomes more green, and, if exposed to the air, will turn of a light brown colour, in consequence of being converted into peroxide of iron. If any sulphate of copper be present, a piece of iron introduced into a solution of it would precipitate copper.

FERRI AMMONIO-CHLORIDUM.

Ammonio-Chloride of Iron.

Ingredients. Sesquioxide of iron, hydrochloric acid, hydrochlorate of ammonia, and distilled water.

Decomposition. The sesquioxide of iron and hydrochloric acid decompose each other; the chlorine combines with the iron, forming a sesquichloride of iron, the oxygen and hydrogen combining to form water; to this the hydrochlorate of ammonia is added. After evaporation, the residue consists of about 15 per cent. of sesquichloride of iron, the rest being hydrochlorate of ammonia, in a state of admixture rather than chemical combination.

Qualities. It is quite soluble in proof spirit and in water. This solution affords a precipitate of sesquioxide of iron, if potash is added to it; and if added in excess, ammonia is evolved.

TINCTURA FERRI SESQUICHLORIDI.

Tincture of Sesquichloride of Iron.

Ingredients. Sesquioxide of iron, hydrochloric acid, and rectified spirit.

Decomposition. The chlorine of the acid combines with the iron, forming the sesquichloride, and the hydrogen, with the oxygen, forms water. A little carbonic acid escapes with effervescence, in consequence of there being generally a little carbonate combined with the sesquioxide of iron. The sesquichloride is held in solution by the spirit.

Composition.

1½ chlorine = 54
1 iron = 28
82

One ounce of this solution will yield about 30 grains of sesquioxide of iron.

Ferri Iodidum. *Iodide of Iron.*

Ingredients. Iodine, iron filings, distilled water.

This is a case of simple combination between the iodine and the iron, forming the iodide or ioduret of iron, which is procured in the solid form by expelling the water. It is to be kept away from the air and light, that it may not be decomposed. The iron is apt to be converted into sesquioxide, to prevent which it is recommended to keep a piece of iron wire in it.

Composition.

1 iodine = 126
1 iron = 28
5 water 5 × 9 = 45
Atomic number 199

Qualities. By heat it emits vapour of iodine. When pure it is quite soluble in water; if not, sesquioxide of iron will be precipitated. This is also formed when the iodide has been dissolved some time.

FERRI POTASSIO-TARTRAS.

Potassio-tartrate of Iron.

Ingredients. Sesquioxide of iron, hydrochloric acid, solution of potash, bitartrate of potash, solution of sesquicarbonate of ammonia, and distilled water.

Decomposition. When the first two ingredients are mixed together, the same change takes place as in the tinctura ferri sesquichloridi. In the second stage, potash and the chloride are both decomposed, the chlorine combining with potassium forms chloride of potassium, the oxygen of the potash, with the iron, forms sesquioxide of iron, which is to be washed to obtain it pure.

When to this the bitartrate of potash is added, a portion of the acid combines with the oxide of iron, forming a solution of sesquitartrate of iron with tartrate of potash. If the liquid has an acid reaction, the ammonia is to be added to saturate the excess of acid. By evaporation, the substance is procured in a solid form.

Composition, according to Mr. Phillips.

1 tartrate of potash = 114
1 tartrate of sesquioxide of iron = 106
220

Qualities. It is entirely soluble in water, does not change the colour of litmus or turmeric ; is not, like other salts of sesquioxide of iron, rendered blue by ferrocyanide of potassium ; neither acids nor alkalies produce any precipitate ; with other salts of the peroxide, alkalies cause the oxide to be precipitated. The magnet having no effect upon it shows the absence of metallic iron.

FERRI SESQUIOXYDUM, *Sesquioxide of Iron.*

Ingredients. Sulphate of iron, carbonate of soda, and boiling water.

Decomposition. The sulphuric acid combines with the soda, forming sulphate of soda in solution ; the carbonic acid unites with the oxide of iron, forming carbonate of iron. By exposure to the air, the iron attracts more oxygen, becoming sesquioxide, and most of the carbonic acid is expelled.

Qualities. It is soluble in hydrochloric acid, with a little effervescence, showing the presence of some carbonic acid, and should be entirely precipitated from this solution by ammonia.

PRÆPARATA EX HYDRARGYRO.

PREPARATIONS OF MERCURY.

HYDRARGYRUM CUM CRETA.
Mercury with Chalk.

Ingredients. Mercury and chalk.

Process. By rubbing these together, the mercury is minutely divided, and mechanically mixed with the chalk. By long trituration, a portion of the mercury may become oxidized.

Qualities. By heat the mercury is driven off in vapour, and a white substance (the chalk) remains, and is soluble in acetic acid, with effervescence. This solution should not be coloured by hydrosulphuric acid; if it is, it shows that the mercury was not pure, and that the adulterating metal remained with the chalk, and was probably carbonate of lead.

HYDRARGYRI OXYDUM. *Oxide of Mercury.*

Ingredients. Chloride of mercury and lime-water.

Decomposition. The chloride of mercury and lime decompose each other, producing a chloride of calcium in solution, and a protoxide of mercury precipitated, which is to be washed to remove any lime.

Qualities. If digested with hydrochloric acid for a little time, chloride of mercury will be formed, and, being insoluble, will remain at the bottom of the vessel, and the liquid will afford no precipitate with solution of potash, or oxalate of ammonia. If there be any orange-red precipitate with the potash, it shows the presence of binoxide of mercury; if a white precipitate is thrown down with the oxalate of ammonia, lime will be present. It is entirely soluble in acetic acid, and by heat is vaporizable; if not, there is some impurity.

The protoxide of mercury is black. By keeping and exposure to light, it is liable to be partially decomposed, changing to a lighter gray colour, and will be found to consist of a mixture of protoxide of mercury, binoxide of mercury, and metallic mercury.

Composition.

1 oxygen	=	8
1 mercury	=	202
		210

Hydrargyri Binoxydum. *Binoxide of Mercury.*

Ingredients. Bichloride of mercury, solution of potash, and distilled water.

Decomposition. One equivalent of bichloride of mercury decomposes two equivalents of potash, the two of chlorine with two of potassium form two equivalents of chloride of potassium, and the two of oxygen with the one of mercury form binoxide of mercury, which is precipitated.

Composition.

2 oxygen	2 × 8 =	16
1 mercury	=	202
		218

Qualities. When heat is applied it loses oxygen, and either passes into vapour or metallic mercury: it is entirely soluble in hydrochloric acid.

Hydrargyri Nitrico-oxydum.
Nitric Oxide of Mercury.

Ingredients. Mercury, nitric acid, and distilled water.

Decomposition. A portion of the nitric acid is decomposed, giving oxygen to the mercury to form binoxide of mercury, binoxide of nitrogen flying off, and with the oxygen of the air forming nitrous acid fumes; the undecomposed nitric acid then unites with the binoxide of mercury, forming pernitrate of mercury, which by evaporation is obtained as a white salt.

When this pernitrate is heated, the nitric acid is expelled, leaving binoxide of mercury, with sometimes a small quantity of nitrate.

Qualities. If properly prepared, it emits no nitrous fumes on the application of heat. The water in which it may be boiled or washed should afford no precipitate with lime-water or hydrosulphuric acid, showing the absence of nitrate of mercury or other metallic salts.

HYDRARGYRI AMMONIO-CHLORIDUM.

Ammonio-chloride of Mercury.

Ingredients. Bichloride of mercury, solution of ammonia, and distilled water.

Decomposition. The changes which take place here are not thoroughly agreed upon by chemists. Mr. Hennel considered that white precipitate is a compound of one equivalent of binoxide of mercury with one of hydrochlorate of ammonia. Mr. Phillips is of opinion that it is a compound of 1 peroxide of mercury, 1 bichloride of mercury, and 2 of ammonia, and is formed in the following manner: when the bichloride of mercury, ammonia, and water are mixed together, one equivalent of bichloride decomposes two equivalents of water, the chlorine forming, with the hydrogen, two equivalents of hydrochloric acid, and these, with two of ammonia, form two equivalents of soluble hydrochlorate of ammonia; the two equivalents of oxygen of the water, with one of mercury, forming binoxide of mercury, which immediately unites with one equivalent of undecomposed bichloride and two of ammonia, forming an insoluble white precipitate.

Qualities. By heat it entirely passes into vapour. Digested with acetic acid, no yellow or blue precipitate is formed by adding iodide of potassium. It is not turned black by lime-water. It is entirely soluble in hydrochloric acid without effervescence. Heated with solution of potash, ammonia is evolved and it assumes a yellow colour.

The heat proves the absence of fixed impurities: the iodide of potassium shows the absence of lead or starch. The lime-water proves the absence of protoxide of mercury: the non-effervescence proves that carbonates are not present; and the last is diagnostic of the preparation, as from no other is ammonia evolved, at the same time that a hydrated binoxide of mercury is thrown down.

HYDRARGYRI CHLORIDUM.

Chloride of Mercury, (Calomel.)

Ingredients. Mercury, sulphuric acid, chloride of sodium, and distilled water.

Decomposition. When the acid and half the mercury are boiled together, two equivalents of the acid are decomposed and resolved into sulphurous acid and oxygen; the sulphurous acid flies off in the form of gas, and the two of oxygen with one of mercury form binoxide of mercury, with which two equivalents of undecomposed sulphuric acid combine, to form bisulphate of mercury.

When the rest of the mercury is added, it takes away from the bisulphate one equivalent of oxygen, and one of acid, thus forming protosulphate of mercury. When the protosulphate is triturated with chloride of sodium, the oxygen quits the mercury to unite with sodium and form soda; this, with the sulphuric acid, forms sulphate of soda, and the chlorine unites with the mercury, forming the chloride or calomel, which is separated by sublimation.

Qualities. It forms a whitish powder, and is turned black by lime-water or potash, in consequence of the formation of protoxide of mercury; and this, by heat, will yield globules of mercury. It entirely passes into vapour by heat. Being insoluble, water which is used to wash it should afford no precipitate with nitrate of silver, lime-water, or hydrosulphuric acid; otherwise, some bichloride of mercury, sulphate of mercury, or other metallic substance is present.

Composition.

1	chlorine	=	36
1	mercury	=	202
			238

Hydrargyri Bichloridum.

Bichloride of Mercury, (Corrosive Sublimate.)

Ingredients. Mercury, sulphuric acid, chloride of sodium, and water.

Decomposition. The same chemical action takes place here as in the first stage of the preparation of the chloride; that is, a bisulphate of mercury is formed. When this is dried and mixed with chloride of sodium, and heat is applied, the oxygen of the binoxide of mercury combines with the two of sodium, forming two of soda; these, with the two of sulphuric acid, form two of sulphate of soda; the two of chlorine, with one of mercury, form one equivalent of bichloride of mercury, which is separated from the sulphate of soda by sublimation.

Composition.

2	chlorine	2 × 36	=	72
1	mercury		=	202
				274

Qualities. A colourless crystalline substance: it first melts by heat, and then passes into vapour. It is entirely soluble in water and ether. Potash or lime-water decomposes it, and throws down a red binoxide of mercury, which, by being heated, parts with oxygen, and yields globules of mercury.

Hydrargyri Bicyanidum.

Bicyanide of Mercury.

Ingredients. Percyanide of iron (Prussian blue), binoxide of mercury, and distilled water.

Decomposition. The percyanide and binoxide decompose each other; the cyanogen unites with the mercury to form a soluble bicyanide of mercury; the oxygen with the iron forms a sesquioxide which is precipitated. By evaporation the bicyanide is procured in crystals. It may also be obtained by adding the binoxide of mercury to hydrocyanic acid, when we have formed two equivalents of water, and one of bicyanide of mercury.

Composition.

2 cyanogen 2 × 26 = 52
1 mercury = 202
254

Qualities. It is translucent, and totally soluble in water. When hydrochloric acid is added to it, bichloride of mercury and hydrocyanic acid are formed; the latter of which is known by its odour, and throws down a precipitate from nitrate of silver, soluble in hot nitric acid. By heat cyanogen is evolved, leaving globules of mercury.

This is not given medicinally, and is only intended to be employed in procuring hydrocyanic acid speedily.

HYDRARGYRI IODIDUM. *Iodide of Mercury.*

Ingredients. Mercury, iodine, and alcohol.

The mercury and iodine combine directly, and by heat a substance is obtained of an olive green colour. This is liable to be decomposed by light, which converts it into free mercury and biniodide of mercury.

Composition.

1 iodine = 126
1 mercury = 202
———
328

Qualities. By heat, cautiously applied, it can be sublimed into red scales, which, on cooling, turn yellow, and on the admission of light, black. It is not soluble in chloride of sodium, like the biniodide.

Hydrargyri Biniodidum.

Biniodide of Mercury.

Ingredients. Mercury, iodine, and alcohol.

This is a case of direct combination of iodine with mercury, forming the biniodide.

Composition.

2 iodide 2 × 126 = 252
1 mercury = 202
454

Qualities. By heat, carefully applied, it passes into scales, which turn yellow, and on cooling again becomes red. It is partially soluble in hot rectified spirit, and on cooling the biniodide forms in crystals. It is soluble either in excess of iodide of potassium or bichloride of mercury, and is entirely soluble in chloride of sodium, which will distinguish it from the iodide of mercury.

Hydrargyri Bisulphuretum.

Bisulphuret of Mercury, (Vermilion.)

Ingredients. Mercury and sulphur.

By heating these together, chemical union takes place; bisulphuret of mercury is formed, and a portion of the sulphur is expelled.

Composition.

2 sulphur	2 × 16	=	32
1 mercury		=	202
			234

Qualities. By heat it passes into vapour, and, if potash be added, it affords globules of mercury, in consequence of the action of the sulphur upon the potash. Neither nitric nor hydrochloric acid acts upon it; but when they are mixed and added, the mercury is dissolved. It is insoluble in rectified spirit, and consequently that liquid, after contact with it, acquires no colour. If it be digested with acetic acid, and the liquid affords no yellow precipitate with iodide of potassium, it proves that lead has not been used to adulterate it.

HYDRARGYRI SULPHURETICUM CUM SULPHURE.

Black Sulphuret of Mercury.

Ingredients. Mercury and sulphur.

When these are rubbed together, the mercury combines with part of the sulphur, the rest being mechanically mixed with it.

It is presumed to contain in 100 parts

Bisulphuret of mercury	52
Sulphur	48

Qualities. By heat it entirely passes into vapour, without leaving charcoal or phosphate of lime, showing that animal charcoal has not been mixed with it for adulteration.

PRÆPARATA E MAGNESIO.

PREPARATIONS OF MAGNESIUM.

MAGNESIA. *Magnesia.*

THIS is prepared from the carbonate by the application of white heat, by means of which the carbonic acid is evolved. The heat must be kept up for two hours, and even then it is exceedingly difficult to expel all the carbonic acid. We rarely find a specimen of magnesia totally free from it.

Composition.

1 oxygen	=	8
1 magnesium	=	12
		20

Qualities. It is soluble in hydrochloric acid, without effervescence, and might be distinguished from the other alkaline earths by its solubility in sulphuric acid. The solution, with hydrochloric acid, produces no precipitate with bicarbonate of potash or chloride of barium, showing the absence of lime, and any sulphate. It has a feeble alkaline action on turmeric paper.

Magnesia is much used in pharmacy to assist in extracting the alkaline bases of vegetables.

Magnesiæ Carbonas. *Carbonate of Magnesia.*

Ingredients. Sulphate of magnesia, carbonate of soda, and distilled water.

Decomposition. There is an exchange of acids between the magnesia and soda, the products being sulphate of soda in solution, and carbonate of magnesia precipitated, which is to be thoroughly washed and dried. The boiling is requisite in this process to expel the free carbonic acid, which is capable of rendering carbonate of magnesia soluble.

Composition.

1 carbonic acid = 22
1 magnesia = 20

42

Qualities. A white powder: the water in which it may be boiled does not alter the colour of turmeric; there is no precipitate with chloride of barium or nitrate of silver in this liquid, proving the absence of sulphuric or hydrochloric acid. It is soluble in dilute sulphuric acid, 36.6 per cent. of its weight being lost by the escape of carbonic acid. When the effervescence has ceased, there is no precipitate produced by the bicarbonate of potash; any precipitate would indicate impurity.

PRÆPARATA E PLUMBO.
PREPARATIONS OF LEAD.

Plumbi Acetas. *Acetate of Lead.*

Ingredients. Oxide of lead, acetic acid, and distilled water.

Chemical changes. The acetic acid combines with the oxide of lead, and dissolves it; and, by evaporation, the salt is procured in crystals.

Composition.

1 acetic acid = 51
1 oxide of lead = 112
3 water 3 × 9 = 27
190

Qualities. Quite soluble in water. Its solution affords a white precipitate with carbonate of soda, viz. the carbonate of lead; with iodide of potassium, a yellow precipitate of iodide of lead falls. By hydrosulphuric acid, a black sulphuret of lead is thrown down; with sulphuric acid, a white insoluble sulphate of lead is formed; and the odour of acetic acid is made perceptible. By heat, it first melts, and ultimately is converted into metallic lead.

Liquor Plumbi Diacetatis.

Solution of the Diacetate of Lead.

Ingredients. Acetate of lead, oxide of lead, and water.

When the above ingredients are boiled together, another equivalent of oxide of lead is taken up and dissolved by the acetic acid of the acetate, forming a diacetate, that is, a compound of two equivalents of oxide of lead with one of acetic acid. Its atomic number is 275.

This liquid has long been known under the name of 'Goulard's Extract.'

Composition.

1 acetic acid = 51
2 oxide of lead 2 × 112 = 224
Equivalent 275

The specific gravity of the liquid is 1.260.

Plumbi Chloridum. *Chloride of Lead.*

Ingredients. Acetate of lead, distilled water, and chloride of sodium.

Decomposition. The chlorine of the salt combines with the lead, and is precipitated; the oxygen of the lead combines with the sodium, forming soda, and this, with the acetic acid, forms an acetate of soda in solution.

Composition.

1 chlorine = 36
1 lead = 104
140

Qualities. It is entirely soluble in boiling distilled water, showing the absence of the sulphate of lead, and again falls and crystallizes on cooling. It is blackened by hydrosulphuric acid, which forms a sulphuret of lead, and turns yellow by heat, by the sulphur flying off and the lead attracting oxygen, forming oxide of lead.

This substance is only used pharmaceutically in the preparation of morphia.

PLUMBI IODIDUM. *Iodide of Lead.*

Ingredients. Acetate of lead, iodide of potassium, and distilled water.

Decomposition. The chemical action in this preparation is very similar to the former. The iodine combines with the lead, forming iodide of lead, which is precipitated; the oxygen, with the potassium, forming potash, which is held in solution by the acetic acid.

Composition.

1 iodine = 126
1 lead = 104
230

Qualities. Of a bright yellow colour: is entirely soluble in boiling water, from which it falls, on cooling, in the form of shining yellow scales. It is liquefied by heat, first giving off yellow vapours, and afterwards violet coloured; and the greater part of it is driven off.

PLUMBI OXYDUM HYDRATUM.

Hydrated Oxide of Lead.

Ingredients. Solution of diacetate of lead, distilled water, and solution of potash.

Decomposition. The acetic acid combines with the potash, causing the oxide of lead to be precipitated, in combination with a little water.

Qualities. It should be entirely soluble in nitric acid, otherwise we might infer the presence of some sulphate.

Uses. It is employed in the preparation of the disulphate of quinine, and is not given by itself as a medicine.

PRÆPARATA E POTASSIO.
PREPARATIONS OF POTASSIUM.

Liquor Potassæ. *Solution of Potash.*

Ingredients. Carbonate of potash, lime, and distilled water.

Decomposition. The carbonic acid combines with the lime, forming carbonate of lime, which is insoluble, and remains at the bottom, and the potash set free is held in solution.

This is simply a solution of pure potash in water. It is apt to act upon common flint glass.

Qualities and Tests. Specific gravity 1.063. It has a powerful alkaline reaction, turning turmeric paper brown. No effervescence should arise by adding acids to it, thus showing the absence of carbonic acid; there should be no precipitate from carbonate of soda, chloride of barium, or nitrate of silver, proving the absence of earthy impurities, any sulphate or hydrochlorate; the chloride of platinum occasions a precipitate of a yellow colour with this solution, as well as with the salts of potash, but has no visible effect on soda and its salts; and therefore will readily distinguish potash from soda.

Potassa cum Calce. *Potash with Lime.*

Ingredients. Solution of potash and lime.

By heat most of the water is expelled; and the residue is a mechanical mixture of potash and lime.

It is partially soluble in alcohol, the potash only being taken up.

It is used as a caustic, and as a substitute for the hydrate of potash, being less deliquescent and more manageable.

Potassæ Acetas. *Acetate of Potash.*

Ingredients. Carbonate of potash, acetic acid, and distilled water.

Decomposition. The acetic acid combines with the potash, forming the acetate, carbonic acid flying off; the solution is then evaporated till the salt becomes properly dried.

Composition.

1 acetic acid = 51
1 potash = 48
——
99

Qualities and Tests. It is entirely soluble in water and alcohol. This solution has no effect upon test papers, showing its neutrality. The chloride of barium and nitrate of silver causing no precipitate, prove the absence of sulphates or hydrochlorates. If the solution be concentrated, some acetate of silver may fall, which will be soluble in nitric acid; not so any chloride. By a red heat it is decomposed and converted into carbonate of potash. Sulphuric acid added to it occasions an odour of acetic acid, which is set free.

POTASSÆ CARBONAS. *Carbonate of Potash.*

This substance is obtained from the impure carbonate of potash, commonly named pearlash, by dissolving it in water, then straining to separate earthy matter and other insoluble impurities. By evaporation, the excess of water is expelled, and the salt is obtained in a solid granulated state.

Composition.

1 carbonic acid	=	22
1 potash	=	48
$1\frac{1}{2}$ water	=	13.5
		83.5

Qualities and Tests. It is almost entirely soluble in water; that which is not is some earthy matter: it absorbs water readily if exposed to the air, and spontaneously deliquesces. It changes the colour of turmeric paper to brown. When supersaturated with nitric acid, if there were earthy matter present, it would afford a precipitate with carbonate of soda; chloride of barium would detect any sulphate, and nitrate of silver any hydrochlorate. By heat, 100 parts lose 16 of their weight of water; by adding sulphuric acid, the weight of carbonic acid evolved is equal to 28 parts per cent.

POTASSÆ BICARBONAS. *Bicarbonate of Potash.*

This salt is made by transmitting carbonic acid through a solution of the carbonate of potash to saturation. This is conveniently effected by Woulfe's apparatus: we conclude that the liquid is saturated by the carbonic acid escaping from the last jar. The solution is then to be evaporated with a gentle heat, as a higher temperature would expel the carbonic acid, which has been added.

The carbonic acid is very readily procured by the action of dilute sulphuric acid on powdered chalk.

Composition.

2 carbonic acid 2 × 22 = 44
1 potash = 48
1 water = 9
101

Qualities. It is entirely soluble in water, and very slightly affects the colour of turmeric paper. Sulphate of magnesia causes no precipitate in its solution. By heat, 30.7 parts per cent. of its weight are expelled; chloride of barium should occasion no precipitate in it, and there should be scarcely any by nitrate of silver. If any notable precipitate falls, there is probably a minute portion of chloride of potassium present.

LIQUOR POTASSÆ EFFERVESCENS.

Effervescing Solution of Potash.

This is a solution of bicarbonate of potash, with an additional quantity of carbonic acid forced into it, and retained by pressure.

POTASSÆ HYDRAS.

Hydrate of Potash. (*Fused Potash.*)

This substance is obtained by merely evaporating solution of potash to expel the water as far as possible, and we have left potash with one equivalent of water.

Qualities. In a pure state it is solid and brittle; of a dirty white colour; is exceedingly deliquescent, requiring to be kept in closely stoppered bottles; is entirely soluble in alcohol.

Potassæ Sulphas.

Sulphate of Potash. (*Sal Polychrest.*)

Ingredients. Bisulphate of potash, (which is the salt that remains after the distillation of nitric acid,) and boiling water.

By first exposing this salt to heat, a portion of the sulphuric acid is evolved, and a neutral sulphate remains: this is to be dissolved in water, strained, and the solution evaporated to afford crystals. This salt is anhydrous.

Composition.

1 sulphuric acid = 40
1 potash = 48
88

Qualities. It is insoluble in alcohol, sparingly soluble in water. It produces a yellow precipitate with chloride of platinum, a white one with chloride of barium. It is insoluble in nitric acid.

Potassæ Bisulphas. *Bisulphate of Potash.*

Ingredients. The salt which remains after the distillation of nitric acid, sulphuric acid, and boiling water.

By adding the sulphuric acid to this salt, we prevent the decomposition which would take place if it were dissolved in water and evaporated, viz., the bisulphate would be resolved into sulphate and sesquisulphate, and some acid would be taken up by the water. By evaporating this solution, the salt may be procured in crystals.

Composition.

2	sulphuric acid	2	×	40	=	80
1	potash				=	48
2	water	2	×	9	=	18
						146

Qualities. This salt is more soluble than the former, it has an acid reaction, and produces effervescence with carbonated alkalies.

POTASSÆ TARTRAS. *Tartrate of Potash.*

Ingredients. Bitartrate of potash, carbonate of potash, and boiling water.

Decomposition. By boiling these together, one equivalent of tartaric acid quits the bitartrate to combine with the potash of the carbonate, thus producing two atoms of neutral tartrate of potash, and carbonic acid escapes. The tartrate which is in solution, by evaporation, is procured in crystals.

Composition.

1 tartaric acid = 66
1 potash = 48
114

Qualities. Readily soluble in water. From this solution almost every acid will precipitate bitartrate of potash, which generally adheres to the vessel. Anything which is thrown down by chloride of barium or acetate of lead is soluble in nitric acid, showing that sulphuric acid in no form is present.

Potassii Bromidum. *Bromide of Potassium.*

Ingredients. Bromine, carbonate of potash, iron, and distilled water.

Decomposition. By first mixing, stirring together and heating the water, bromine, and iron, the two latter unite to form a bromide of iron in solution.

When to this, the carbonate of potash is added, the potash and bromide of iron are both decomposed; the oxygen of the potash unites with the iron, forming oxide of iron, which, with the carbonic acid, forms an insoluble carbonate of iron; the bromine, uniting with the potassium, forms a bromide of potassium in solution, which, by evaporation, is procured in crystals.

Composition.

1 bromine = 78
1 potassium = 40

118

Qualities. It is entirely soluble in water; it has neither an acid nor alkaline reaction. If pure, chloride of barium does not cause a precipitate in its solution, showing that there is no sulphuric acid present. When sulphuric acid is added to it, bromine is set free, and will form a yellow colour with starch. It loses none of its weight by heat as it contains no water. Ten grains of this salt decompose 14·28 grains of nitrate of silver, producing a yellowish precipitate of bromide of silver, which is soluble in ammonia, but very sparingly soluble in nitric acid. If the salt produces a larger portion of precipitate, it is probable that there is in it some chloride of potassium.

POTASSII IODIDUM. *Iodide of Potassium.*

Ingredients. Iodine, iron, carbonate of potash, and distilled water.

Decomposition. The chemical action which ensues here is exactly of the same nature as in the former preparation. In the first place there is direct union between the iodine and iron, forming the iodide of iron. When the carbonate of potash is added, the oxygen of the potash combines with the iron, forming oxide of iron, which falls in combination with carbonic acid: the iodine, with the potassium, forms a soluble iodide of potassium, which, by evaporation is procured in crystals.

Composition.

1 iodine = 126
1 potassium = 40
166

Qualities. It is entirely soluble in water and alcohol. It has no effect, or a very slight one, on turmeric paper; no action on litmus. It is anhydrous, and consequently does not lose weight by heat. When sulphuric acid is added to it, iodine is set free, and produces a blue colour with starch. Ten grains of it are sufficient for decomposing 10.24 grains of nitrate of silver, and the iodide precipitated is partly dissolved by nitric acid, and partly altered in its appearance. This is not the case when ammonia is added.

Liquor Potassii Iodidi compositus.

Solution of Iodide of Potassium.

Ingredients. Iodide of potassium, iodine, and distilled water.

The iodide of potassium renders the iodine soluble, and is usually given with it in solution.

Each ounce of this solution contains half a grain of iodide of potassium and a quarter of a grain of iodine.

POTASSII SULPHURETUM.

Sulphuret of Potassium.

Ingredients. Sulphur and carbonate of potash.

Decomposition. When these substances are heated together the carbonic acid is first expelled, and three fourths of the potash are decomposed, and resolved into oxygen and potassium; the oxygen combines with a fourth of the sulphur to form sulphuric acid, which, with the undecomposed potash, forms sulphate of potash; the remaining sulphur combines with the potassium, forming sulphuret of potassium; the resulting substance is a mixture of one equivalent of sulphate of potash, and three of sulphuret of potassium.

Qualities. When recently broken, it has a yellowish brown colour. Dissolved in water or almost any acid it emits an odour of hydrosulphuric acid. Its solution in water is yellow. The precipitate thrown down by acetate of lead is at first red, afterwards black. By long keeping, it is decomposed, and by absorbing oxygen is converted into sulphate of potash, and no longer will evolve hydrosulphuric acid when treated with water or acids.

PRÆPARATA E SODA.
PREPARATIONS OF SODA.

SODÆ CARBONAS. *Carbonate of Soda.*

This may be procured from the impure soda, known as kelp and barilla. By solution and straining most of the impurities are removed; and by evaporation the salt is to be obtained in crystals. From kelp there is a portion of liquid remaining which contains iodine, and which is known by the terms soapmakers' lees, or mother liquors. Almost all the carbonate of soda in this country is now prepared by decomposing common salt and sulphate of soda.

Composition.

1 carbonic acid = 22
1 soda = 32
10 water 10 × 9 = 90
144

Qualities. Recently prepared it is translucent, but soon effloresces in an open vessel. It is entirely soluble in water, but not in alcohol. It changes the colour of turmeric, like alkalies. By drying and exposure to a brisk fire this salt loses 62 per cent. of its weight by the water passing off.

SODÆ CARBONAS EXSICCATA.

Dried Carbonate of Soda.

In this preparation 62 parts per cent. of water are driven off. The intention of this preparation is that it may be administered in the form of powder or pills.

SODÆ SESQUICARBONAS.

Sesquicarbonate of Soda.

This is made by transmitting carbonic acid through a solution of the carbonate to saturation; the solution is then evaporated, and the salt is obtained in a crystalline state.

Composition.

$1\frac{1}{2}$	carbonic acid		= 33
1	soda		= 32
2	water	2 × 9	= 18
		Atomic number	83

Qualities. It is entirely soluble in water. In this solution chloride of platinum occasions no precipitate, nor does sulphate of magnesia, until heat be applied to expel the excess of carbonic acid. If heated, some carbonic acid will be expelled, and dried carbonate of soda remains.

SODÆ SULPHAS.

Sulphate of Soda, (Glauber's Salt.)

Ingredients. The salt which remains after the distillation of hydrochloric acid, carbonate of soda, and boiling water.

Decomposition. Any excess of sulphuric acid remaining with the sulphate is saturated by the soda of the carbonate; carbonic acid is evolved, and the neutral sulphate is procured in crystals by evaporation.

Composition.

1 sulphuric acid = 40
1 soda = 32
10 water 10 × 9 = 90
162

Qualities. It effloresces by exposure to air. It is entirely soluble in water, not at all in alcohol. It has no action on litmus or turmeric. Nitrate of silver causes scarcely any precipitate in a dilute solution of it; nitrate of baryta, a very copious one of sulphate of baryta, which is insoluble in nitric acid. By heat 55 parts per cent. are lost, being the water.

SODÆ POTASSIO-TARTRAS.

Potassio-tartrate of Soda, (Rochelle Salt.)

Ingredients. Bitartrate of potash, carbonate of soda, and boiling water.

Decomposition. One equivalent of acid in the bitartrate saturates the soda, expelling carbonic acid, and a neutral salt remains.

Composition.

1 tartrate of potash		=	114
1 tartrate of soda		=	98
8 water	8 × 9	=	72
	Atomic number		284

Qualities. It is entirely soluble in water, and affords no precipitate with chloride of barium or nitrate of silver, proving the absence of any sulphuric or hydrochloric acid. It produces no effect on litmus or turmeric. If sulphuric acid be added, some bitartrate of potash is formed.

LIQUOR SODÆ EFFERVESCENS.

Effervescing Solution of Soda, (Soda Water.)

This is a solution of sesquicarbonate of soda, with excess of carbonic acid forced into it and retained in it by pressure.

LIQUOR SODÆ CHLORINATÆ.
Chlorinated Solution of Soda.

Ingredients. Carbonate of soda, distilled water, chloride of sodium, binoxide of manganese, and sulphuric acid.

In this preparation the carbonate of soda is first dissolved in water; then the chloride of sodium and binoxide of manganese are put into a retort, and sulphuric acid is added to them, for the purpose of setting free some chlorine.

When these three ingredients are mixed, the following decomposition is, by most chemists, supposed to take place. The binoxide of manganese parts with one equivalent of oxygen, which passes to the sodium, to form soda, and set free one equivalent of chlorine; the sulphuric acid combines with the soda and protoxide of manganese, forming sulphates with those bases, and, by heat, chlorine is driven over.

The chlorine is first made to pass through five ounces of water, that any hydrochloric acid which may escape should be absorbed; the gas then passes into the solution of carbonate of soda, with which it combines. The precise chemical nature of this liquid is not ascertained. It possibly contains some chloride of sodium and hypochlorite of soda.

This liquid, very similar to Labarraque's soda disinfecting liquid, has a pale straw colour, a sharp saline astringent taste; it first reddens then bleaches turmeric paper. It is little affected by heat; by careful evaporation it may be procured in crystals. By spontaneous evaporation chlorine is evolved, and carbonate of soda alone remains.

PRÆPARATA E ZINCO.

PREPARATIONS OF ZINC.

ZINCI OXYDUM. *Oxide of Zinc.*

Ingredients. Sulphate of zinc, sesquicarbonate of ammonia, and distilled water.

Decomposition. The sulphuric acid, by its greater affinity, combines with the ammonia, forming a soluble sulphate; a portion of carbonic acid, with the oxide of zinc, forms an insoluble carbonate, which is precipitated. When the carbonate is heated, the carbonic acid is evolved, and the oxide remains.

Composition.

1 oxygen = 8
1 zinc = 32

Atomic number 40

The substance sold as oxide of zinc in the shops is oftentimes carbonate of zinc, which may be detected by acids added to it causing effervescence.

Zinci Sulphas. *Sulphate of Zinc.*

Ingredients. Zinc and dilute sulphuric acid.

Decomposition. A portion of the water is decomposed; its oxygen combines with the zinc, to form oxide of zinc, and hydrogen gas escapes; the acid then seizes on the oxide of zinc, forming the sulphate in solution, which, by evaporation, is procured in crystals.

Composition.

1 sulphuric acid = 40
1 oxide of zinc = 40
7 water $7 \times 9 = 63$
Atomic number 143

Qualities. It is entirely soluble in water. In this liquid, solution of ammonia throws down a white precipitate, viz. the oxide of zinc, soluble in excess of ammonia. Chloride of barium produces a copious white precipitate of sulphate of baryta; and acetate of lead causes a white sulphate of lead to be thrown down. Hydrosulphuric acid, also, occasions a white precipitate.

MISTURÆ. MIXTURES.

MIXTURES are compounds in common use, most of which may be kept ready for a considerable period: they frequently contain a mucilaginous gummy matter, which acts mechanically by holding in suspension resinous or oily substances which are not soluble in the water.

MISTURA ACACIÆ.

This, commonly known as Mucilage of Acacia, is very serviceable in suspending in water resinous tinctures, such as of tolu, guaiacum, &c., and should be used in the following manner: mix gradually in a mortar the tincture and mucilage, and syrup if used, by trituration, and when thoroughly blended, very gradually add the watery menstruum, still carefully rubbing all together.

MISTURA AMMONIACI.

Ammoniacum Mixture. (*Lac Ammoniaci.*)

This has a milky appearance, owing to the oil and resin being merely mechanically suspended by the gum.

MISTURA AMYGDALÆ.

Almond Mixture. (Almond Emulsion.)

This has a white milky appearance, owing to the oil being in a minutely divided state.

MISTURA ASSAFŒTIDÆ. *Assafœtida Mixture.*

This is rather milky, like ammoniacum mixture, for similar reasons, but not so white.

MISTURA CAMPHORÆ. *Camphor Mixture.*

This contains about a grain of camphor in an ounce. Camphor mixture is very commonly made by putting a lump of camphor into a bottle of water, shaking it up occasionally, and straining for use. Tincture of myrrh rubbed with camphor renders it much more soluble in water, so that we can easily obtain five or six grains in the ounce.

MISTURA CRETÆ. *Chalk Mixture.*

This is liable to fermentation and decomposition in hot weather, and consequently should not be prepared or kept in large quantities.

MISTURA FERRI COMPOSITA.

Compound Mixture of Iron. (Griffith's Mixture.)

Ingredients. Myrrh, carbonate of potash, rose-water, sulphate of iron, spirit of nutmeg, and sugar.

Decomposition. The sulphuric acid leaves the iron and combines with the potash, whilst the carbonic acid unites with the iron, forming a carbonate of iron, which is partly suspended by the myrrh. In making this mixture the sulphate of iron is added last in order that it may be exposed to the air as short a time as possible; for when exposed it speedily attracts oxygen, and becomes a sesquioxide of iron. This mixture, when properly made, is of a green colour, owing to the carbonate of the protoxide of iron; but by keeping and exposure it loses its colour and becomes dirty brown, from the formation of peroxide of iron. The real quantity of protoxide of iron in the mixture is only about one grain in an ounce and a half.

MISTURA GUAIACI ET MISTURA MOSCHI.

Guaiacum Mixture and Musk Mixture.

In these mixtures the principal ingredients are mechanically suspended by the acacia.

OLEA DESTILLATA.

DISTILLED OILS. ESSENTIAL OILS.

Essential oils are obtained from vegetables by putting the substance into an alembic with water, and then applying heat and distilling over the oil, together with some water. The oil is separated from the water partly by pouring off, partly by means of the separatory funnel, and sometimes by capillary attraction.

Distilled oils are compounds of oxygen, hydrogen, and carbon, possess a strong taste, impart a flavour to water although almost insoluble in it, are very soluble in spirit, generally of a very light specific gravity although five are heavier than water, viz. cinnamon, cassia, sassafras, cloves, and pimenta: they have a variety of colours, are easily volatilized, do not leave a greasy stain on paper; exposed to the air they become thick, approaching to resin in their character, and do not form distinct soaps with alkalies. They are obtained from various parts of plants, such as the fruit, the flowers, the berries, tops, and in many cases from the entire plant.

OLEUM SUCCINI. *Oil of Amber.*

By application of the heat of a sand bath to amber contained in an alembic, a liquid passes over containing succinic acid, an oil, and a saline matter. The oil is to be distilled two or three times.

OLEUM TEREBINTHINÆ PURIFICATUM.

Purified Oil of Turpentine.

By slowly distilling oil of turpentine with water a portion of more solid impurity is left in the retort, and we procure the oil colourless and of a lighter specific gravity.

PILULÆ. PILLS.

Pills are compounds easily made by pounding and rubbing, requiring little particular observation. They should be kept in jars carefully covered, as most of them are apt to become dry by exposure and long keeping.

Pilulæ Ferri Compositæ.

Compound Pills of Iron.

Ingredients. Myrrh, carbonate of soda, sulphate of iron, and treacle.

Decomposition. The sulphuric acid of the iron combines with the soda, and the carbonic acid unites with the iron, forming a carbonate of iron.

This pill should only be prepared for immediate use, from the probability of the iron passing into a peroxide. Soda is used in preference to potash, on account of the latter having a tendency to absorb water, and thus render the pills too moist and soft; the quantity of protoxide of iron present is little more than a grain in fifteen grains of the pill.

PILULÆ HYDRARGYRI.

Pills of Mercury. (Blue Pill.)

In making this pill the labour is much lessened if a portion of the old mass be used to rub with the mercury to make a new quantity. Some attempt to "kill" the mercury by less legitimate means, such as by the use of a little sulphur.

It is generally believed that the mercury in this pill is only in a state of minute division.

PULVERES. POWDERS.

POWDERS are dry preparations obtained by pounding, grinding, and sifting, to obtain them in a minute state of division, and mixed ready for use.

SPIRITUS. SPIRITS.

These are preparations in which rectified spirit is the chief menstruum, and in obtaining all of them distillation is had recourse to.

Alcohol.

Ingredients. Rectified spirit and chloride of calcium.

By distilling rectified spirit with chloride of calcium, the latter absorbs and retains part of the water, and the spirit passes over, stronger and of a lighter specific gravity. The only difference between alcohol and rectified spirit is in the quantity of water present.

Qualities. Its specific gravity is .815; colourless; by heat passes entirely into vapour; combines and mixes with water and with ether; tastes and smells of wine.

Spiritus Ammoniæ. *Spirit of Ammonia.*

Ingredients. Hydrochlorate of ammonia, carbonate of potash, rectified spirit, and water.

Decomposition. When the above are mixed together, the hydrochloric acid and potash decompose each other, the chlorine with the potassium forming chloride of potassium, the oxygen of the potash with the hydrogen of the acid forming water, and the carbonic with the ammonia forming carbonate of ammonia. By the application of heat, carbonate of ammonia and rectified spirit pass over into the receiver.

Composition.

1 carbonic acid	=	22
1 ammonia	=	17
		39

This solution is much stronger than the Sp. Ammoniæ Aromat. in the proportion of 4 to 1.

SPIRITUS AMMONIÆ AROMATICUS.

Aromatic Spirit of Ammonia. (Sal Volatile.)

Ingredients. Hydrochlorate of ammonia, carbonate of potash, cinnamon, cloves, lemon-peel, rectified spirit, and water.

Decomposition. The chemical action here is just the same as in Spiritus Ammoniæ. By the heat applied we have passing into the receiver carbonate of ammonia, rectified spirit, and water, flavoured by the aromatics.

By referring to the ingredients used, and the quantity distilled, it will be evident that this liquid possesses only one fourth the strength of the former.

Spiritus Ammoniæ Fœtidus.

Fœtid Spirit of Ammonia.

Ingredients. Hydrochlorate of ammonia, carbonate of potash, rectified spirit, water, and assafœtida.

Decomposition. The chemical action is precisely the same as in Spiritus Ammoniæ, and the solution distilled over consists of rectified spirit flavoured by assafœtida, holding in solution carbonate of ammonia.

The other spirits require no especial notice.

SYRUPI. SYRUPS.

SYRUPS are preparations containing sugar, mostly used to sweeten, flavour, or colour medicines. They are very prone to ferment, and should consequently be kept in a cool place, if possible where the temperature never exceeds 55 degrees. The average quantity of sugar is about 2½ pounds to the pint of liquid; if more be used the sugar will partly crystallize at the bottom of the vessel.

SYRUPUS PAPAVERIS.

Syrup of the (white) Poppy.

This is made by boiling the capsules (deprived of the seeds) in water, thus making a decoction, and subsequently adding the sugar. This syrup is the most unsatisfactory preparation in the Pharmacopœia, in consequence of the uncertainty of its strength, the frequent use made of it, and the number of deaths caused by its use and abuse. Medical men should reject it altogether. When properly prepared, three drachms are considered equal to one grain of opium; and of such strength a teaspoonful is sufficient to kill most young infants. By keeping and fermenting, it appears to acquire additional strength by producing acetic acid, which, with morphia, will form an acetate.

TINCTURÆ. TINCTURES.

Tinctures are spirituous liquids holding a quantity of vegetable matter in solution. Most of them are made with proof spirit, in which the ingredients are macerated for about a fortnight, occasionally shaking them, at the end of which time the tincture is filtered through paper, in order to obtain it perfectly clear. When the dregs are in large quantity they are generally put into flannel bags, and submitted to pressure by a screw press. Tinctures are preparations which generally admit of being kept for a very long time without their activity being impaired, and should always be kept in closely stoppered vessels.

Distillation is not employed in making any of the tinctures.

Tinctura Aloes. *Tincture of Aloes.*

This is made with a liquid weaker than proof spirit, being a better solvent of the aloes.

Tinctura Ammoniæ Composita.

Compound Tincture of Ammonia.

It was formerly named Spiritus Ammoniæ Succinatus, and is made by first macerating and dissolving the mastich in rectified spirit, and afterwards mixing with it the other ingredients.

The following tinctures are made with rectified spirit, because their active principle generally resides in resinous and oily matter.

Tinct. Assafœtidæ.
,, Tolutani.
,, Benzoini.
,, Camphoræ.
,, Castorei.
,, Guaiaci.
,, Iodinii comp.
,, Kino.
,, Myrrhæ.
,, Zingiberis.

VINA. WINES.

Wine is little used as a medical menstruum. It is used in a few instances because the substances acted upon are soluble in it, and act more pleasantly as regards the spirit; they are weaker than tinctures, and are more prone to decomposition. They should be prepared in closed glass vessels, and during maceration be frequently shaken. The time of maceration is fourteen days.

UNGUENTA. OINTMENTS.

These are greasy preparations, of a softer consistence than cerates, and more convenient for use in the winter. There are few of them requiring particular notice.

Unguentum Cantharidis.

Ointment of Cantharides.

This is made by first boiling the cantharides in water down to half the quantity; then straining the liquid and mixing it with the resin-cerate, and evaporating to a proper consistence.

VEGETABILIA. VEGETABLES.

Vegetables should be gathered in dry weather, free both from showers and dew, and should be collected annually, and those longer kept ought to be rejected. Moisture will hasten the decomposition of plants, and render them mouldy. Light, heat, and air impair the virtues of plants, and consequently they should be kept in closed vessels excluded from light and moisture. The active matter is frequently of a volatile nature, which makes it desirable that they should be collected annually.

Most roots are to be dug up before the stalks or leaves shoot out, because at that time they contain all the principles of the plant.

Barks should be collected in that season when they can most easily be separated from the wood. The best period is in the spring, when the sap is flowing, and at that time the bark contains most active matter. The bark is removed from some trees in the autumn.

Leaves should be collected either before the flowers have expanded or the seeds have become ripe, being found at that period to be most efficacious.

Flowers are to be gathered as soon as blown, for then their aroma is most abundant.

Seeds should be gathered as soon as ripe, and be kept in their natural covering or pericarp.

Plants are to be dried at a gentle heat, for a higher temperature would be likely to expel much of their active matter.

Roots which are ordered to be kept fresh or moist should be covered over by dry sand, which prevents the escape of moisture and the access of air and insects, and helps to keep their temperature uniform.

The bulb of the squill and cormus of the colchicum are ordered to be cut into transverse slices, in consequence of the vessels running in a horizontal direction, and thus the proper juices are better retained.

The cassia pulp is extracted from the pods by first breaking and bruising them in a mortar, then pouring on boiling water to wash out the pulp, which is subsequently to be strained though a coarse sieve and afterwards evaporated to a proper consistence.

The pulp and juice of ripe and fresh fruit should be pressed through a sieve, and no boiling had recourse to.

Gum Resins, if necessary, may be purified in two ways: In the first place they may be boiled in water till they become so soft as to pass through a canvass cloth, they must then be allowed to stand, that the resinous part may subside; the supernatant liquid containing the gum is to be evaporated, and towards the end mixed with the resinous part that they again form one mass. Secondly, gum resins which melt easily may be enclosed in a bullock's bladder, and thus be immersed in boiling water until they become so soft that they can be squeezed through a canvass cloth by a press, and be deprived of their impurities.

Styrax Balsam is imported in an impure solid form, and is separated from its impurities by the action of rectified spirit, which dissolves out the resin and benzoic acid, and is removed from them by distillation. The styrax thus procured is named "strained storax."

TABLE,

SHOWING THE PROPORTION IN WHICH OPIUM AND CERTAIN PREPARATIONS OF ANTIMONY, ARSENIC, AND MERCURY, ARE CONTAINED IN SOME COMPOUNDS.

OPIUM.

Confectio Opii. Thirty-six grains contain one grain of opium.

Enema Opii. Four ounces contain thirty minims of tincture of opium.

Linimentum Opii contains one fourth of tincture of opium.

Pil. Saponis comp. and *Pil. Styracis comp.* Five grains contain one grain of opium.

Pulvis Cretæ compositus cum Opio. Two scruples contain one grain of opium.

Pulvis Ipecacuanhæ compositus. Ten grains contain one grain of opium.

Pulvis Kino compositus. One scruple contains one grain of opium.

Tinctura Opii. Nineteen minims contain about one grain of opium.

Tinctura Camphoræ composita. Four fluid drachms contain nearly one grain of opium.

Vinum Opii. Twenty minims are equal to one grain of opium.

ANTIMONY.

Vin. Ant. Potassio-tartratis. One fluid ounce contains two grains of tartarized antimony.

MERCURY.

Ceratum Hydrargyri comp. contains one part of mercury in four and a half.

Emplastrum Hydrargyri, and *Empl. Hyd. comp.* contain one part of mercury in five.

Hydrargyrum cum Cretâ. Three grains contain one grain of mercury.

Liquor Hydrargyri Bichloridi. An ounce contains half a grain of the bichloride of mercury.

Linimentum Hydrargyri. Six drachms contain about one drachm of mercury.

Pilula Hydrargyri Chloridi composita. Five grains contain about one grain of the chloride of mercury.

Pil. Hydrargyri Iodidi. Five grains contain one grain of the iodide of mercury.

Unguentum Hydrargyri Fortius. Two drachms contain one drachm of mercury.

Unguentum Hydrargyri Mitius. Six drachms contain one drachm of mercury.

ARSENIC.

Liquor Potassæ Arsenitis. Two fluid drachms contain one grain of the arsenious acid.

TABULAR ARRANGEMENT OF PLANTS,

USED MEDICINALLY,

WITH THE CLASSES AND ORDERS ACCORDING TO THE SEXUAL ARRANGEMENT OF LINNÆUS, AND THE NATURAL ORDERS ACCORDING TO LINDLEY.

BOTANICAL NAMES.	CLASS.	ORDER.	NATURAL ORDER.
Acacia catechu	Polygamia	Monœcia	Leguminosæ
,, vera			
Acinula clavus	Cryptogamia	Fungi	Fungaceæ
Aconitum napellus	Polyandria	Trigynia	Ranunculaceæ
,, paniculatum			
Acorus calamus	Hexandria	Monogynia	Acoraceæ
Allium cepa	Hexandria	Monogynia	Liliaceæ
,, porrum			
,, sativum			
Althæa officinalis	Monadelphia	Polyandria	Malvaceæ
Alpinia cardamomum	Monandria	Monogynia	Zingiberaceæ
Amygdalus communis	Icosandria	Monogynia	Rosaceæ

Aloe spicata ,, vulgaris	Hexandria	Monogynia	Liliaceæ
Amyris elemifera ,, gileadensis	Octandria	Monogynia	Amyridaceæ
Anchusa tinctoria	Pentandria	Monogynia	Boraginaceæ
Anethum fœniculum ,, graveolens	Pentandria	Digynia	Umbellatæ
Anthemis nobilis ,, pyrethrum	Syngenesia	Superflua	Synantheraceæ
Arctostaphylos uva ursi	Decandria	Monogynia	Ericaceæ
Aristolochia serpentaria	Gynandria	Hexandria	Aristolochiaceæ
Arnica montana	Syngenesia	Superflua	Synantheraceæ
Artemisia abrotanum ,, absinthium ,, maritima ,, santonica	Syngenesia	Superflua	Synantheraceæ
Asarum europæum	Dodecandria	Monogynia	Aristolochiaceæ
Aspidium filix mas	Cryptogamia	Filices	Filicaceæ
Astragalus verus	Diadelphia	Decandria	Leguminosæ
Atropa belladonna	Pentandria	Monogynia	Solanaceæ
Avena sativa	Triandria	Digynia	Graminaceæ
Balsamodendron myrrha	Octandria	Monogynia	Burseraceæ
Boswellia serrata	Decandria	Monogynia	Burseraceæ

BOTANICAL NAME.	CLASS.	ORDER.	NATURAL ORDER.
Cephaelis ipecacuanha	Pentandria	Monogynia	Cinchonaceæ
Canella alba	Decandria	Monogynia	Clusiaceæ
Capsicum annuum	Pentandria	Monogynia	Solanaceæ
Cardamine pratensis	Tetradynamia	Siliquosa	Brassicaceæ
Carum carui	Pentandria	Digynia	Umbellatæ
Carophyllus aromaticus	Icosandria	Monogynia	Myrtaceæ
Cassia fistula	Decandria	Monogynia	Leguminosæ
,, senna			
Cathartocarpus, vide Cassia.			
Cetraria, vide Lichen.			
Chimaphila corymbosa	Decandria	Monogynia	Pyrolaceæ
Chironea vel erythræa centaurium	Pentandria	Monogynia	Gentianaceæ
Cinchona cordifolia	Pentandria	Monogynia	Cinchonaceæ
,, lancifolia			
,, oblongifolia			
Cissampelos pareira	Diœcia	Monadelphia	Menispermaceæ
Citrus aurantium	Polyadelphia	Icosandria	Aurantiaceæ
,, limetta			
,, medica			
Cocculus palmatus, vide Menispermum.			
Cochlearia armoracia	Tetradynamia	Siliculosa	Brassicaceæ
Cocos butyracea	Monœcia	Hexandria	Palmaceæ
Colchicum autumnale	Hexandria	Trigynia	Melanthaceæ

Conium maculatum	Pentandria	Digynia	Umbellatæ
Convolvulus scammonia	Pentandria	Monogynia	Convolvulaceæ
Copaifera officinalis, vel langsdorfii	Decandria	Monogynia	Amyridaceæ
Coriandrum sativum	Pentandria	Digynia	Umbellatæ
Crocus sativus	Triandria	Monogynia	Iridaceæ
Croton cascarilla „ tiglium	Monœcia	Monadelphia	Euphorbiaceæ
Cucumis colocynthus	Monœcia	Monadelphia	Cucurbitaceæ
Curcuma longa	Monandria	Monogynia	Zingiberaceæ
Cuminum cyminum	Pentandria	Digynia	Umbellatæ
Cusparia febrifuga, vide Galipœa.			
Cydonia, vide Pyrus.			
Cytisus scoparius	Diadelphia	Decandria	Leguminosæ
Daphne mezereum	Octandria	Monogynia	Thymelaceæ
Datura stramonium	Pentandria	Monogynia	Solanaceæ
Daucus carota, vel sylvestris	Pentandria	Digynia	Umbellatæ
Delphinium staphysagria	Polyandria	Trigynia	Ranunculaceæ
Dianthus carophyllus	Decandria	Digynia	Silenaceæ
Digitalis purpurea	Didynamia	Angiospermia	Scrophulariaceæ
Diosma crenata	Pentandria	Monogynia	Rutaceæ
Dolichos pruriens	Diadelphia	Decandria	Leguminosæ
Dorema ammoniacum	Pentandria	Digynia	Umbellatæ
Dorstenia contrajerva	Tetrandria	Monogynia	Urticaceæ

BOTANICAL NAME.	CLASS.	ORDER.	NATURAL ORDER.
Erythræa, vide Chironea.			
Euphorbia officinalis	Dodecandria	Trigynia	Euphorbiaceæ
Ferula assafœtida	Pentandria	Digynia	Umbellatæ
Ficus carica	Polygamia	Diœcia	Urticaciæ
Fœniculum vulgare, vide Anethum.			
Fucus vesiculosus	Cryptogamia	Algæ	Algaceæ
Galbanum officinale	Pentandria	Digynia	Umbellatæ
Galipea cusparia	Diandria	Monogynia	Rubiaceæ
Gentiana lutea	Pentandria	Digynia	Gentianaceæ
Glycyrrhiza, vide Liquiritia.			
Guaiacum officinale	Decandria	Monogynia	Zygophyllaceæ
Hæmatoxylon campechianum	Decandria	Monogynia	Leguminosæ
Helleborus fœtidus ,, officinalis	Polyandria	Polygynia	Ranunculaceæ
Helonias officinalis	Hexandria	Trigynia	Melanthaceæ
Heracleum gummiferum	Pentandria	Digynia	Umbellatæ
Hordeum distichon	Triandria	Digynia	Graminaceæ
Humulus lupulus	Diœcia	Pentandria	Urticaceæ
Hyoscyamus niger	Pentandria	Monogynia	Solanaceæ

Inula helenium - -	Syngenesia	Superflua	Syantheraceæ
Ipomæa jalapa - -	Pentandria	Monogynia	Convolvulaceæ
Juniperus communis ,, lycia ,, sabina -	Diœcia	Monadelphia	Pinaceæ
Krameria triandria - -	Tetrandria	Monogynia	Polygalaceæ
Lactuca sativa ,, virosa - -	Syngenesia	Æqualis	Synantheraceæ
Laurus camphora ,, cassia ,, cinnamomum ,, nobilis ,, sassafras -	Enneandria	Monogynia	Lauraceæ
Lavandula spica - -	Didynamia	Gymnospermia	Labiatæ
Leontodon taraxacum -	Syngenesia	Æqualis	Synantheraceæ
Lichen islandicus ,, rocella -	Cryptogamia	Lichenes	Lichenaceæ
Linum catharticum ,, usitatissimum -	Pentandria	Pentagynia	Linaceæ
Liquiritia officinalis - -	Diadelphia	Decandria	Leguminosæ

BOTANICAL NAME.	CLASS.	ORDER.	NATURAL ORDER.
Lobelia inflata	Pentandria	Monogynia	Lobeliaceæ
Lythrum salicaria	Dodecandria	Monogynia	Salicariæ
Malva sylvestris	Monadelphia	Polyandria	Malvaceæ
Maranta arundinacea	Monandria	Monogynia	Marantaceæ
Marrubium vulgare	Didynamia	Gymnospermia	Labiatæ
Melaleuca Cajuputi, vel minor	Polyadelphia	Icosandria	Myrtaceæ
Melissa officinalis	Didynamia	Gymnospermia	Labiatæ
Menispermum palmatum	Diœcia	Dodecandria	Menispermaceæ
Mentha piperita ,, pulegium ,, viridis	Didynamia	Gymnospermia	Labiatæ
Menyanthes trifoliata	Pentandria	Monogynia	Gentianaceæ
Momordica elaterium	Monœcia	Monadelphia	Cucurbitaceæ
Morus nigra	Monœcia	Tetrandria	Urticaceæ
Mucuna pruriens	Diadelphia	Decandria	Leguminosæ
Myristica moschata	Diœcia	Monadelphia	Myristicaceæ
Myroxylon peruiferum	Decandria	Monogynia	Amyridaceæ
Myrtus pimenta	Icosandria	Monogynia	Myrtaceæ
Nicotiana tabacum	Pentandria	Monogynia	Solanaceæ
Olea europea	Diandria	Monogynia	Oleaceæ

Origanum marjorana	Didynamia	Gymnospermia	Labiatæ
,, vulgare			
Ornus europea	Diandria	Monogynia	Oleaceæ
Oxalis acetosella	Decandria	Pentagynia	Oxalidaceæ
Papaver rhæas	Polyandria	Monogynia	Papaveraceæ
,, somniferum			
Pastinaca opoponax	Pentandria	Digynia	Umbellatæ
Pimpinella anisum	Pentandria	Digynia	Umbellatæ
Pinus abies	Monœcia	Monadelphia	Pinaceæ
,, balsamea			
,, larix			
,, sylvestris			
Piper cubeba	Diandria	Digynia	Piperaceæ
,, longum			
,, nigrum			
Pistacia lentiscus	Diœcia	Pentandria	Anacardiaceæ
,, terebinthus			
Polygala senega	Diadelphia	Octandria	Polygalaceæ
Polygonum bistorta	Octandria	Trigynia	Polygonaceæ
Potentilla tormentilla	Icosandria	Polygynia	Rosaceæ
Prunus domestica	Icosandria	Monogynia	Amygdaleæ
Pterocarpus erinaceus	Diadelphia	Decandria	Leguminosæ
,, santalinus			

BOTANICAL NAME.	CLASS.	ORDER.	NATURAL ORDER.
Punica granatum	Icosandria	Monogynia	Myrtaceæ
Pyrus cydonia	Icosandria	Pentagynia	Pomeæ
Quassia excelsa	Decandria	Monogynia	Simarubaceæ
,, simaruba			
Quercus infectoria	Monœcia	Polyandria	Corylaceæ
,, pedunculata			
,, robur			
Rhamnus catharticus	Pentandria	Monogynia	Rhamnaceæ
Rheum palmatum	Enneandria	Trigynia	Polygonaceæ
,, undulatum			
Rhus toxicodendron	Pentandria	Trigynia	Anacardiaceæ
Ricinus communis	Monœcia	Monadelphia	Euphorbiaceæ
Roceella, vide Lichen.			
Rosa canina	Icosandria	Polygynia	Rosaceæ
,, centifolia			
,, gallica			
Rosmarinus officinalis	Diandria	Monogynia	Labiatæ
Rumex acetosa	Hexandria	Digynia	Polygonaceæ
,, aquaticus			
Ruta graveolens	Decandria	Monogynia	Rutaceæ

Saccharum officinarum	Triandria	Digynia	Graminaceæ
Sagus Rumphii	Monœcia	Hexandria	Palmaceæ
Salix alba	Diœcia	Diandria	Salicaceæ
,, caprea			
,, fragilis			
Salvia officinalis	Diandria	Monogynia	Labiatæ
Sambucus nigra	Pentandria	Trigynia	Caprifoliaceæ
Scilla maritima	Hexandria	Monogynia	Liliaceæ
Scrophularia nodosa	Didynamia	Angiospermia	Scrophulariaceæ
Secale cereale	Triandria	Digynia	Graminaceæ
Simaruba officinalis	Decandria	Monogynia	Simarubaceæ
Sinapis alba	Tetradynamia	Siliquosa	Brassicaceæ
,, nigra			
Smilax officinalis	Diœcia	Hexandria	Smilaceæ
Solanum dulcamara	Pentandria	Monogynia	Solanaceæ
,, tuberosum			
,, nigrum			
Solidago virgaurea	Syngenesia	Superflua	Synantheraceæ
Spartium scoparium	Diadelphia	Decandria	Leguminosæ
Spigelia Marilandica	Pentandria	Monogynia	Spigeliaceæ
Stalagmitis cambogioides	Polygamia	Monœcia	Guttiferæ
Strychnos nux vomica	Pentandria	Monogynia	Apocynaceæ
Styrax benzoinum	Decandria	Monogynia	Styraceæ
,, officinale			

BOTANICAL NAME.	CLASS.	ORDER.	NATURAL ORDER.
Tamarindus indica	Monadelphia	Triandria	Leguminosæ
Tanacetum vulgare	Syngenesia	Superflua	Synantheraceæ
Triticum hybernum	Triandria	Digynia	Graminaceæ
Tussilago farfara	Syngenesia	Superflua	Synantheraceæ
Ulmus campestris	Pentandria	Digynia	Ulmaceæ
Valeriana officinalis	Triandria	Monogynia	Valerianaceæ
Veratrum album	Polygamia	Monœcia	Melanthaceæ
Vitis vinifera	Pentandria	Monogynia	Vitaceæ
Zingiber officinale	Monandria	Monogynia	Zingiberaceæ

THERMOMETERS.

Heat has a considerable influence upon bodies, in respect to the space that they occupy, the form which they assume, and the effects required to be produced in them. The quantity of free heat is ascertained by a thermometer, and the information is imparted by the degree of expansion which bodies employed for the purpose undergo. Mercury is chiefly used on account of its regularity of contraction or expansion from the withdrawal or application of heat, and it retains a liquid form in a greater range of temperature than any other fluid. The thermometers most in use are Fahrenheit's, Reaumur's, and the Centigrade, only differing from each other in the mode of graduation. In the scale of Fahrenheit the boiling point of water is 212 degrees; the freezing point 32 degrees below which is 0 or zero, being supposed by Fahrenheit to be the lowest degree of heat, otherwise the coldest point, although since his time a degree of cold has been ascertained as low as 140 degrees below zero. The particular temperatures marked upon the ordinary Fahrenheit thermometer are the following:

Boiling point of water	212
Spirit boils - -	176
Fever heat - -	110
Blood heat - -	98
Summer heat - -	76
Temperate heat -	55
Water freezes - -	32
Zero point - -	0

Calor lenis, gentle heat of the Pharmaeopœia, is understood to be a temperature between 90 and 100 degrees.

In France, Sweden, and some other parts of Europe, the Centigrade scale is generally adopted; and in Italy and in the northern parts of Germany Reaumur's scale is used. In reading foreign scientific works we find temperatures designated in accordance with the above scales, and it is consequently desirable to know with what degree of Fahrenheit's scale they correspond; the proportion of degrees between the freezing and boiling points in the three scales is 80, 100, and 180, each of which divided by twenty gives the figures 4, 5, and 9, representing the proportions to each other. To reduce the Centigrade scale to Reaumur's or vice versâ, is most easy; thus, suppose we take the boiling point of the Centigrade thermometer, and reduce it to Reaumur's, we divide by 5, and multiply by 4; thus,

5 | 100
20
4
80 boiling point of Reaumur.

To reduce Reaumur to the Centigrade scale divide by 4 and multiply by 5; thus,

Boiling point of Reaumur 4 | 80
20
5
Boiling point of the Centigrade 100

The reduction of the Centigrade and Reaumur's scale to Fahrenheit is attended with a little more difficulty, in consequence of the difference in the zero point: the freezing point of water in Fahrenheit's scale being 32 degrees above zero; consequently, in comparing Fahrenheit's with other scales we must subtract or add 32.

To reduce the Centigrade to Fahrenheit's scale at the boiling point, divide by 5, multiply by 9, and, lastly, add 32, as follows:

Centigrade. 5 | 100
20
9
180
32
212

To reduce Reaumur to Fahrenheit divide by 4, multiply by 9, and then add 32; thus,

$$\begin{array}{r} 4\,|\,80 \\ \hline 20 \\ 9 \\ \hline 180 \\ 32 \\ \hline 212 \end{array}$$

In reducing Fahrenheit's scale to either of the others, we must first subtract 32, then divide by the large number, and multiply by the small; thus,

$$\begin{array}{lr@{\qquad}lr} \text{Fahrenheit} & 212 & & 212 \\ & 32 & & 32 \\ \cline{2-2}\cline{4-4} & 9\,|\,180 & & 9\,|\,180 \\ \cline{2-2}\cline{4-4} & 20 & & 20 \\ & 5 & & 4 \\ \cline{2-2}\cline{4-4} \text{Centigrade} & 100 & \text{Reaumur} & 80 \end{array}$$

For very low temperatures a spirit thermometer is used, since alcohol has never been satisfactorily frozen, and the mercurial thermometer is only available as far as between 39 and 40 degrees below zero, as at this point mercury passes from a liquid to a solid state.

Very high temperatures are ascertained by an instrument called a pyrometer, and those of Mr. Daniell are generally preferred. The principle of Mr. Daniell's pyrometer is this: it is constructed with a tube of blacklead earthenware, within which is a bar of platinum, and which reaches a piece of porcelain placed above it, and this acts upon an index pointing to a scale. The platinum and blacklead earthenware will bear the highest heat of fire without fusing.

SPECIFIC GRAVITY.

By specific gravity is understood the relative weight of equal bulks of bodies.

The weight of a body is indicated by the force required to overcome its attraction of gravitation, and this is called its absolute weight.

In taking specific gravities we must of course have some standard of comparison, and for this purpose atmospheric air is taken as the standard of comparison for gases and vapours; and distilled water is compared with liquids and solids.

The mode of proceeding is as follows: To ascertain the specific weight of gases we employ a glass globe of a size to contain a certain quantity of atmospheric air, furnished with a stop cock. The weight of the apparatus is previously ascertained, and the bulk of the air contained has a certain known weight. The next thing to be done is to expel the atmospheric air, and introduce in its place the gas of which we wish to ascertain the weight. The air is best got rid of by exhausting the globe by the air-pump, and connecting it with a jar previously filled with the gas in a state of purity. The apparatus is then weighed, and we ascertain the difference in the weight of the atmospheric air, and of the gas which replaced it: thus, if a given bulk of atmosphere weigh 1000 grains, an equal bulk of hydrogen will weigh 68.9 grains, i. e. nearly 69 grains; an equal bulk of chlorine will weigh 2470 grains.

The specific gravity of liquids is ascertained most easily. For the purpose we employ a glass bottle, made expressly to contain 500 or 1000 grains of distilled water, in addition to the weight of the glass: a mark is made in the neck of the bottle at the point to which the water rises; we then pour out the water and dry the bottle, and then introduce the liquid to be weighed exactly up to the same point as the water. The bottle is then weighed in a pair of scales, and the weight of the liquid is ascertained. Thus, suppose the bottle held 1000 grains of water, an equal bulk of alcohol will be found to weigh only 815 grains, whilst the same bulk of mercury will weigh 13545 grains.

The specific gravity of solids is attended with a little more trouble, and still more so when they are lighter than water: and sometimes we are called upon to ascertain the specific gravity of such as are soluble in water. The specific gravity of solids heavier than water, and insoluble in it, is ascertained in the following manner.

We will suppose that we have a piece of metal: First, weigh it in ordinary scales and ascertain its weight; this is called its absolute weight, and we find it to weigh 500 grains. The next point to be ascertained is how much water equal in bulk to the metal would weigh; and this we discover in two ways. One mode of proceeding is to suspend the metal by a fine thread at one end of the beam, and let it dip into water, and then weigh it: we find that it weighs less by many grains, now weighing only 450; thus it has lost 50 grains in its weight; and this represents the weight of an equal bulk of water. The other mode of proceeding consists in putting the piece of metal into a vessel previously filled with water: the water is displaced exactly in proportion to the bulk of the metal, and we find that it weighs 50 grains; and thus the proportion of 50 to 500 is as 1 to 10; and, as we agree upon taking the specific gravity of water as 1.000, the metal will be represented by 10.000.

When we wish to ascertain the specific gravity of bodies lighter than water, we proceed as in the former case, and ascertain the absolute weight, and then to ascertain the weight of an equal bulk of water we must append to the light body a sufficient quantity of some solid of known weight, to keep it under water, and when the weight of the water displaced is ascertained, the weight of the attached body is to be subtracted from that of the water, and the two may then be compared.

The specific gravity of solids soluble in water may be sometimes ascertained by substituting either spirits of turpentine or other liquid. In this case the proceeding is similar to the above, but in addition we have to take into account the relative weight of the liquid used and that of water.

WEIGHTS AND MEASURES.

In the London Pharmacopœia all medicines are ordered to be prepared in accordance with troy weight; but druggists are in the habit of buying and selling by avoirdupois weight. The proportions of the two weights to each other will be evident from the following tables, and it will be observed that, although the pound avoirdupois is greater than the pound troy weight, the ounce troy contains more grains than the ounce avoirdupois. Troy weight is thus arranged:

lb. Pound.		℥ Ounce.		ʒ Drachm.		℈ Scruple.		gr. Grain.	
1	=	12	=	96	=	288	=	5760	lb.
		1	=	8	=	24	=	480	℥
				1	=	3	=	60	ʒ
						1	=	20	℈

Thus, 20 grains make 1 scruple.
3 scruples ,, 1 drachm.
8 drachms ,, 1 ounce.
12 ounces ,, 1 pound.

Avoirdupois weight is divided in the following manner, the pound consisting of 7000 grains:

lb.		oz.		dr.		gr.
Pound.		Ounces.		Drachms.		Grains.
1	=	16	=	256	=	7000
		1	=	16	=	437.50
				1	=	27.34

Liquids are now ordered to be measured in accordance with the standard of the Imperial gallon, which is subdivided as follows for medicinal purposes:

Congius		Octarius		fl. ℥		fl. ʒ		♏
Gallon.		Pint.		Fluid oz.		Fluid dr.		Minims.
1	=	8	=	160	=	1280	=	76800
		1	=	20	=	160	=	9600
				1	=	8	=	480
						1	=	60

60 minims make 1 drachm.
8 drachms ,, 1 ounce.
20 ounces ,, 1 pint.
8 pints ,, 1 gallon.

QUESTIONS

UPON

PHARMACEUTICAL CHEMISTRY,

CAPABLE OF BEING ANSWERED BY REFERENCE TO THE PRECEDING PARAGRAPHS.

What are acids, and how are they known?
What is distilled vinegar?
How is it prepared?
Why is a glass retort and receiver used?
Why is the last pint left behind?
What are the impurities of common vinegar?
How much sulphuric acid is allowed to be added?
How is the legitimate quantity ascertained?
How is the strength of distilled vinegar known?
What do the following tests, viz. Acetate of Lead, Nitrate of Silver, Iodide of Potassium, Hydrosulphuric Acid, Ammonia, and Silver Leaf, refer to?
What is the acetic acid of the Pharmacopœia?
What other names has it?
How is it procured, and what is the decomposition in the process?
Why should the heat not be raised too high?
How is acetate of soda procured?
What are the qualities of acetic acid?
How much carbonate of soda will 100 grains of this acid saturate?
What is the atomic composition of acetic acid?

How is benzoic acid obtained?
Why is it pressed in bibulous paper?
Where does the oil come from?

By what other process might it be procured?
What decomposition takes place in this process?
In what does it differ from the acid procured by sublimation?
What are the qualities of benzoic acid?
What is its atomic composition in the dry and crystallized state?
What is the composition of benzule?

What ingredients are used in obtaining citric acid?
What is the composition of lemon-juice?
What is the decomposition, and its object?
How much citric acid is contained in lemon-juice?
What is the atomic composition of citric acid in the dry and crystallized state?
What are its qualities?
What impurities are most likely to be present in it?
What do the following tests refer to, viz. Acetate of Lead, Salts of Potash, and Heat?

What ingredients are used in procuring hydrochloric acid?
What apparatus is used?
What is done with the water?
What is the decomposition?
What is medicinal hydrochloric acid?
How much of the gas does water absorb?
What is the composition of hydrochloric acid gas?
What are its qualities?
How much carbonate of soda does liquid hydrochloric acid saturate?
What do the following tests refer to, viz. Chloride of Barium, Ammonia and Sesquicarbonate of Ammonia, and Gold Leaf?

What ingredients are used in preparing dilute hydrocyanic acid?
What is the decomposition?
How is the strength of the acid ascertained?
By what other mode may hydrocyanic acid be procured?
Why should it be kept excluded from the light and air?

What are its qualities?
What do the following tests refer to, viz. Hydrosulphuric acid, Iodo-cyanide of Potassium and Mercury, and Nitrate of Silver?
How much real acid is contained in this preparation?
What is the composition of hydrocyanic acid?

How is nitric acid procured?
What are the ingredients?
What is the decomposition?
What are the advantages of using an excess of sulphuric acid?
What is the composition of anhydrous nitric acid?
How much water is there in liquid nitric acid?
What are its qualities?
What is its saturating power; and what do the following tests refer to, viz. Nitrate of Silver and Chloride of Barium?
What are the proportions in making dilute nitric acid?

How is phosphoric acid procured?
What ingredients are used?
What is the decomposition?
What care is requisite?
What is the composition of phosphoric acid?
What are its qualities?
How is the strength ascertained?
What do the following tests refer to, viz. Chloride of Barium, Nitrate of Silver, and Hydrosulphuric acid?

What proportions are used in making dilute sulphuric acid?
How is sulphuric acid or oil of vitriol procured?
What are the chemical changes?
How is the strength of the acid ascertained?
What impurities are found in sulphuric acid?
What is its composition, dry and liquid?
How is 'Nordhausen' sulphuric acid procured?

How is tartaric acid procured?

What ingredients are used?
What is the decomposition in the four successive processes?
What are its qualities and tests?
What is its atomic composition in the dry and crystallized state?

What are the preparations of ether?
How is sulphuric ether procured?
What ingredients are used?
What is the decomposition?
What is the composition of ethule?
,, ,, ether?
,, ,, alcohol?
What is the decomposition in forming ether?
Why is carbonate of potash used?
What are the qualities of sulphuric ether?

What is ethereal oil?
What ingredients are used?
What is the decomposition?
What are the elements of oil of wine?
,, ,, etherole?
Why is the potash used?
What are the qualities of ethereal oil?

How is nitric ether obtained?
What ingredients are used?
What is the decomposition?
What remains in the retort?
What is the composition of nitric ether?
What are its qualities? what effect has it upon guaiacum?

What is the composition of sp. æth. sulph. compositus, and what are the advantages of the combination?

What are the alkaline preparations of the Pharmacopœia?
How are alkalies known?
What are their effects upon colours?
How do alkalies exist in vegetables?

What are their chemical qualities? and upon what general principles can they be obtained?
What is the composition of the alkaloids?
In what respect do nicotine and conia differ from them?

How is aconitine procured?
What ingredients are used?
What is the decomposition?
When is the charcoal used in preparing the alkaloids generally?
What are the qualities of aconitine?
What is its atomic composition?

How is the sesquicarbonate of ammonia procured?
What ingredients are used?
What is the decomposition?
What is the composition of the salt?
What is the probable state of it?
Why is it a sesquicarbonate?
What are its qualities?
What do the tests, Chloride of Barium and Nitrate of Silver refer to?

What is liquor ammoniæ?
How is it made? what ingredients are used?
What is the chemical decomposition?
How much ammonia, by weight and by volume, is contained in liquor ammoniæ?
What is the composition of ammonia?
What are its qualities?
What do the following tests refer to, viz. Lime-water, Sesquicarbonate of Ammonia, and Nitrate of Silver?

How is liquor ammoniæ acetatis made?
What are the ingredients?
What is the decomposition?
How is it known that it is perfectly saturated?
What may redden litmus in it, if the ammonia be saturated by acetic acid?

What are its qualities?
What do Hydrosulphuric Acid, Nitrate of Silver, and Chloride of Barium refer to?

How is morphia procured?
What is the decomposition?
What are its qualities and tests?
Is morphia given medicinally?
What is the composition of morphia?

How is acetate of morphia made?

How do you procure hydrochlorate of morphia?
What ingredients are used?
What is the particular use of the ammonia?
What are the qualities of this salt?
What effect has nitrate of silver upon it?

How is disulphate of quina prepared?
What ingredients are used?
What is the decomposition?
What is the atomic composition of quina, and of the disulphate of quina?
What are its qualities?
What impurity does the ammonia refer to?

How is strychnia procured?
What ingredients are used?
Why are spirit and water used separately?
What is the composition of strychnia?
What are its qualities?
What does the strychnia of the shops often contain?

How is veratria procured?
What ingredients are used?
What is the decomposition?
What is the composition of veratria?
What are its qualities?

How is animal charcoal purified?
What is the use of the hydrochloric acid?
For what is this charcoal preferable?

What does burnt horn contain?
In what state does the animal matter fly off?

What do prepared shells contain?
How are they obtained in a fine state of powder?

How is distilled water procured?
Why are the first two pints thrown away?
What impurities are usually found in spring and river water?
What is deposited by such water when boiling?
How are Lime, Sulphuric Acid, Chlorides, and Carbonic Acid detected?

How are aromatic waters obtained?
What parts of plants are used in the several processes?
What difference is made in the quantity of the dry and fresh herb employed?
How are the artificial or imitations of the distilled waters made?
What objection is there to the process?
Can elder-flower water be made as directed?

What are cerates, and what do they uniformly contain?
What is to be remarked in making the following, viz. Cer. Calaminæ, Cer. Cantharidis, and Ceratum Saponis?

How is almond confection made?
Why is it kept in the form of powder?
What parts are used in making Conf. Rosæ Caninæ, and Conf. Rosæ Gallicæ?

What are decoctions?
How are they made?
To what substances are they applicable?

How is dec. cinchonæ distinguished by sight from the infusion of cinchona?
How is decoctum sarzæ made?

What are plasters; how made, and used?
What is the use of water in making the emplastrum opii?

What are extracts?
How are they made?
Which of the extracts are expressed juices?
How is purified extract of aloes prepared?
How is extract of elaterium procured, and with what is it adulterated?
Which of the extracts are made by decoction?
How is extract of jalap prepared, and why in a peculiar manner?
In what does the extract of stramonium differ from all the other extracts?

What sort of preparations are infusions?
To what substances is infusion adapted?
How long are the various infusions macerated?

What kind of preparations are the liniments?
What is the nature of linimentum ammoniæ?

How is dried alum procured?
What is the composition of alum?
How much of its weight does it lose by drying?
What are its qualities?
To what do potash and ammonia refer?
What are the ingredients in liq. alumin. comp.?
What decomposition ensues here?

What are the preparations of antimony?
What ingredients are used in making the oxysulphuret of antimony?
What is the decomposition in the process?
What is the composition of it in 100 parts?
What are its qualities?

How is tartarized antimony made?
What ingredients are used?
What is the decomposition?
Why is the hydrochloric acid used?
What is the composition of tartarized antimony?
What are its qualities?
To what do Hydrosulphuric Acid, Chloride of Barium, Nitrate of Silver, and Nitric Acid refer?

How is the pulv. antimonii comp. made?
What are the ingredients?
What is the decomposition?
What is the probable state of the powder?
Why is this powder not to be depended upon?

How is cyanide of silver obtained?
What are the ingredients?
What is the decomposition?
What is its atomic composition?
What are its qualities, and for what is it used?

How is nitrate of silver made?
What ingredients are employed?
What is the decomposition?
What is the use of the water?
What is the composition of this salt?
What are its qualities?
To what do the following tests refer, viz. Copper, Chloride of Sodium, Ammonia, and Hydrosulphuric Acid?

What are the ingredients used in liq. potassæ arsenitis?
What is the decomposition here?
What is the use of the compound tincture of lavender in the solution?

How is chloride of barium made?
What are the ingredients used?
What is the decomposition?
What are the properties of it?
What is it chiefly used for?

How is trisnitrate of bismuth obtained?
What are the ingredients used, and what is the decomposition?
What is remarkable of nitrate of bismuth?
What is the composition of the trisnitrate?
What are its qualities?
What do the Hydrosulphuric Acid, Nitric Acid, and Sulphuric Acid, refer to?

How is lime obtained?
How much of its weight does chalk lose by burning?
What are the qualities of lime?
Why is heat evolved when lime and water come into contact?
How is lime-water made?
What happens during the process?
Why is an excess of lime ordered to be kept in the bottles?
How much lime is dissolved by a pint of water, at the temperature of 32, 55, and 212?
What are the qualities of lime-water?

What ingredients are used in making chloride of calcium?
What is the decomposition?
What are the qualities of it?
What is referred to by the following tests; viz. Ammonia, Chloride of Barium, and Ferro-cyanide of Potassium?

How is chlorinated lime made?
What apparatus is used?
How is the chlorine set free?
How does it combine with the lime?
What are the qualities of calx chlorinata?
How is prepared chalk procured?
What is the nature of elutriation?
In testing it, what do the Hydrochloric Acid and Ammonia refer to?

How is ammonio-sulphate of copper made?
What is the decomposition?

What visible changes occur during the process?
What are the qualities of this salt?

What ingredients are used in making sulphate of iron?
What is the decomposition?
What is the composition of the crystallized salt?
What changes ensue when it is exposed to the air?
What are its qualities?
What does a clean piece of iron as a test refer to?

How is ammonio-chloride of iron made?
What are the ingredients, and the decomposition?
What does the salt consist of?
What are its qualities?

How is the tincture of sesquichloride of iron made?
What is the decomposition?
How much sesquioxide of iron will this solution yield?

How is the iodide of iron procured?
What care must be taken in keeping it?
What is its atomic composition?
What are its qualities?

How is the potassio-tartrate of iron made?
What is the decomposition?
What is its composition when made?
In testing its qualities, what do the Alkalies and the Magnet refer to?

How is the sesquioxide of iron obtained?
What is the decomposition?
When does the iron become peroxidized?
What are its qualities?

How is mercury with chalk made?
What are the qualities of this powder?
What are the impurities referred to?

How is oxide of mercury obtained?
What is the decomposition?
What are its qualities?
What do the Solution of Potash and Oxalate of Ammonia refer to?
What change takes place in this powder by exposure to light?
What is its atomic number?

How is binoxide of mercury formed?
What is the decomposition?
What are its qualities?

How is the nitric oxide of mercury made?
What are the ingredients, and the decomposition?
What is the colour of the pernitrate of mercury?
What are the qualities of the nitric oxide?
What do Lime-water and Hydrosulphuric Acid refer to?

How is ammonio-chloride of mercury prepared?
What are the ingredients, and the chemical action?
What are its qualities?
What do the following tests refer to, viz. Heat, Lime-water, not effervescing with acids, and Solution of Potash?

How is calomel made?
What are the ingredients?
What is the decomposition?
What are its qualities?
What impurities do the following tests refer to, viz. Nitrate of Silver, Lime-water, and Hydrosulphuric Acid?
What is the equivalent of calomel?

How is the bichloride of mercury made?
What chemical changes ensue in making it?
How is it separated from the sulphate of soda?
What is its atomic composition?
What are its qualities?

How is the bicyanide of mercury procured?
What ingredients are used in making it?
What is the chemical decomposition?
By what other mode can it be made?
What is the atomic composition of the bicyanide?
What are its qualities?
What use is made of it?

How is the iodide of mercury made?
What happens to it by exposure to light?
What is its composition and qualities?

How is the biniodide of mercury formed?
What are its qualities?
How is it distinguished from the iodide besides its colour?

How is bisulphuret of mercury made?
What are its qualities?
In testing it, what do Rectified Spirit and Iodide of Potassium refer to?

How is the black sulphuret of mercury obtained?
When made, what is it supposed to contain in 100 parts?
What may it be adulterated with?

How is magnesia procured?
What does it generally contain?
What is its atomic number?
What are its qualities?
What do the tests, Bicarbonate of Potash and Chloride of Barium refer to?
What frequent use is made of magnesia in pharmacy?

How is carbonate of magnesia obtained?
What is the decomposition?
Why is boiling had recourse to?
What are its qualities?
How much per cent. of carbonic acid does it contain?
What do the following tests refer to, viz. Chloride of Barium, Nitrate of Silver, and Bicarbonate of Potash?

How is acetate of lead made?
What are the chemical changes?
What is the composition of the crystallized salt?
What are its qualities?

How is the liquor plumbi diacetatis made?
What are the ingredients and the chemical action?
What is the popular name of this liquid?
What is its composition and specific gravity?

How is chloride of lead made?
What are its qualities?
What use is made of it?

How is the iodide of lead procured?
From what ingredients?
What is the chemical decomposition?
What are its qualities?

How is hydrated oxide of lead obtained?
What is the decomposition?
What are its qualities?
What is it employed in?

How is solution of potash made?
What is the decomposition?
What are its qualities?
What effect has Chloride of Platinum upon potash and its salts?
What do the following tests refer to, viz. Carbonate of Soda, Chloride of Sodium, and Nitrate of Silver?

How is potash with lime made?
What effect has alcohol upon it?
Why is it preferred to caustic potash?

How is acetate of potash procured?
What is the decomposition?
What are its qualities?

How is carbonate of potash procured?
What is its ordinary composition?
What are its qualities and tests?
How much water and carbonic acid per cent. are contained in it?

How is bicarbonate of potash made?
What apparatus is used?
At what temperature should the solution of it be evaporated?
How is the carbonic acid procured for the purpose?
What is the atomic composition of this salt?
What are its qualities?
How much water does it lose by heat?
What do the tests, Chloride of Barium and Nitrate of Silver, refer to?

What is the nature of the liquor potassæ effervescens?

How is the hydrate of potash obtained?
What are its qualities?
What will happen to it if exposed to the air?
How does alcohol distinguish it from potassa cum calce?

How is the sulphate of potash procured?
What salt remains after distilling nitric acid?
What are the qualities of sulphate of potash?

How is the bisulphate of potash obtained?
Why is more sulphuric acid added?
What is its atomic composition?
How is it distinguished from the sulphate of potash?

How is tartrate of potash made?
What is the decomposition?
What are its qualities?
What do the Chloride of Barium and Acetate of Lead allude to?

How is bromide of potassium made?

What ingredients are used?
What is the chemical action?
What is the atomic composition?
What are its qualities?
What effect has starch with sulphuric acid upon it?
Why is it tested with Chloride of Barium and Nitrate of Silver?

How is iodide of potassium procured?
What is the decomposition?
What is the atomic composition?
What are its qualities?
What effect has heat upon it?
What is meant by ANHYDROUS?
What effect does starch with sulphuric acid produce upon it?

What is contained in liquor potassæ iodidi compositus?
What is the advantage of combining the two?
How much of each is contained in the solution?

How is potassii sulphuretum prepared?
What is the decomposition?
What does it consist of when made?
What are its qualities?
How does it behave in water?
What is it converted into by long keeping?

How is carbonate of soda obtained?
What is kelp?
What is barilla?
What remains after separating carbonate of soda from kelp?
How is carbonate of soda chiefly procured at present?
What is its composition when crystallized?
What are its qualities?
How much does it lose in weight by burning?

What is the use of preparing the dried carbonate of soda?

How is the sesquicarbonate of soda made?

What are its qualities?
What is its composition when crystallized?
Why do chloride of platinum and sulphate of magnesia occasion no precipitate with it?

How is sulphate of soda prepared?
What is the decomposition?
What is its atomic composition when crystallized?
What are its qualities?
What is meant by efflorescence?
Why does it not act upon litmus or turmeric?
What does nitrate of baryta throw down from it?
How much does this salt lose in weight by heat?

How is potassio-tartrate of soda prepared?
What is the decomposition?
What is the composition of the crystallized salt?
What are its qualities?
What happens when sulphuric acid is added to it?

What is liquor sodæ effervescens?
How much soda is contained in it?

How is liquor sodæ chlorinatæ procured?
What apparatus is used?
How is the chlorine evolved?
Why is it transmitted through warm water?
What does the solution probably contain?
What are the qualities of this liquid?
For what is it chiefly employed?

How is oxide of zinc procured?
What is the decomposition?
Why is heat applied?
What is the atomic number of oxide of zinc?
What is the state of the oxide of zinc of the shops?

How is sulphate of zinc procured?
What is the chemical action?
What is the composition of the crystallized salt?

What are its qualities?
What effect does hydrosulphuric acid produce upon it?

What is the character of mixtures?
What is mistura acaciæ used for in pharmacy?
What is the appearance of mistura ammoniaci?
Why does it look milky?
How much camphor is contained in mist. camphoræ?
What will increase the solubility of camphor in water?

How is the compound iron mixture made?
What is the decomposition?
Why is the sulphate of iron added last?
What is the colour of the mixture when first made, and afterwards if kept carelessly?
How much oxide of iron is contained in it?

How are essential oils procured?
How are they separated from the water?
What is the composition of these oils?
What is there remarkable about their specific gravity, colour, &c.?
From what parts of plants are they obtained?
What is obtained by heating amber in an alembic on a sand bath?

How is the compound iron pill made?
What is the decomposition?
Why is soda used instead of potash?
How much iron is contained in the pill?

How is blue pill made?
How may the labour be diminished?
What is the state of the mercury in this pill?

How are the spirits obtained?
What is used in obtaining alcohol?
In what does alcohol differ from rectified spirit?
What are its qualities?

What is spiritus ammoniæ when made?
What is it obtained from?
What is the decomposition?
What is the strength of sp. ammoniæ compared with sp. ammon. ar.?

How is aromatic spirit of ammonia obtained?
What is the decomposition?
Which aromatics are employed?

How is the sp. ammoniæ fœtidus made?
What is the decomposition and strength of this liquid?

How are syrups made?
How much sugar do they contain, and at what temperature should they be kept?
What is the strength of syrup of white poppy?
What objections are there to its use?

How are tinctures generally made?
Which of the tinctures are made with rectified spirit?

What preparations are made with wine in the Pharmacopœia?

What sort of preparations are the ointments?

Why should vegetables be collected free from rain or dew, be collected annually, and kept from the light and air?
When should roots be dug up?
When should barks be collected?
When should leaves, flowers, and seeds be gathered?
At what temperature should plants be dried?
How can roots be kept fresh or moist for some time?
How may the bulb of squill and cormus of colchicum be prepared and dried?
How is cassia pulp obtained?
How may gum resins be purified?
How is styrax balsam prepared for medical use?

How much opium is contained in the following preparations? viz.

Conf. opii.
Enema opii.
Linimentum opii.
Tinctura opii.
Vinum opii.
Pil. saponis comp.
,, styracis comp.
Pulv. cret. comp. c. opio.
,, ipecacuanhæ comp.
,, kino comp.
Tinct. camph. comp.

How much tartarized antimony is contained in antimonial wine?

How much mercury is contained in the various preparations, and in what form?

Cerat. hyd. comp.
Empl. hydr.
,, ,, c. ammoniaco.
Hyd. c. cretâ.
Liq. hydrarg. bichl.
Linimentum hydr.
Pil. hyd. chlor. c.
,, ,, iodidi.
Ung. hyd. fortius.
,, ,, mitius.

How much arsenious acid is contained in liquor potassæ arsenitis?

What effect has heat upon bodies?

How is free heat ascertained?

What is a thermometer?

What liquid is used chiefly for thermometers?

What thermometers are most in use?

What is the boiling and freezing point in each scale?

What is the lowest degree of heat?

What are the particular temperatures marked upon thermometers?
What is gentle heat of the Pharmacopœia?
What is the proportion of the Centigrade, Reaumur, and Fahrenheit's thermometers to each other?
How is the Centigrade scale reduced to Reaumur's, and vice versâ?
How is the Centigrade scale reduced to Fahrenheit's?
Why must 32 be added?
How is Fahrenheit's scale reduced to the Centigrade and Reaumur's?
What thermometer is used for very low temperatures?
How are very high temperatures ascertained?
What is the construction and principle of Mr. Daniell's pyrometer?

What is meant by specific gravity?
What is the absolute weight of a body?
In taking specific gravity, what things are taken as standards of comparison?
How is the specific gravity of gases and vapours ascertained?
How is the air removed from the bottle?
How is the specific gravity of liquids ascertained?
How is the specific gravity of solids found when heavier than water, when lighter than water, and when soluble in water?

What weights are used by medical men, and by chemists?
What pound is heaviest, and contains most grains?
What is the difference in the ounce by troy and avoirdupois weight?
How is the troy pound divided?
How is the pound avoirdupois divided?
How many grains are contained in the pound?
How are liquids ordered to be measured?
How is the gallon divided?
How many ounces are contained in the imperial pint measure?

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